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ABSTRACT

This document contains three products of the Skills Enhancement Program, a cooperative venture between Industrial Technology Institute (ITI), Wayne County (Michigan) Community College (WCCC), and Great Lakes Steel (GLS). The performance report describes the project's objective of designing a job-related literacy curriculum for hourly workers and project activities--worker recruitment; literacy audit; development of self-instructional booklets, a job skills database, and an administration manual; implementation through tutoring at WCCC and GLS; and evaluation. The evaluation report contains nine sections: approach; administration; needs assessment; presentation of findings; use of materials; use by students; use during one-to-one tutoring; use as course materials; and overall findings. The administration manual includes the following sections: foreword; introduction; demographics of GLS; job analysis and training at GLS; set-up of a workplace literacy program; program administration and implementation; project administration and implementation; specialized materials/Tech Prep workbook; evaluation; and three appendices. The appendices are as follows: historical overview of training electrical craft personnel, work breakdown task list by ITI staff, and evaluation forms. Nine figures are included. (NLA)

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Skills Enhancement Program

Performance Report
Evaluation Report
Administration Manual

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Office of Educational Research and Improvement
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PERFORMANCE REPORT

U.S. Department of Education
Office of Adult and Vocational Education
National Workplace Literacy Program

Grant Number: V198A800020
Recipient: Industrial Technology Institute, Ann Arbor Michigan
Organizational Partners: Wayne County Community College (Downriver Campus)
and Great Lakes Division of National Steel Corporation
Period of Award: 6/1/90 -- 11/30/91
Submitted by: Dale C. Brandenburg, Project Director

A. Compare actual accomplishment to objectives contained in the approved application.

There exist two means to compare intended vs. actual accomplishments for this project. First, the original proposal states a number of objectives that were addressed during the effort. Secondly, because the actual statement of work was negotiated after the grant was awarded, this scope of work statement offers another basis for comparison. Both are addressed here beginning with the original proposal.

The following commentary reflects on the objectives of the project and a discussion of relevant results.

OVERALL EXPECTED OUTCOME
A workforce prepared for technical training through this literacy program (Tech Prep), contextually functional curriculum materials, and an established literacy program.

OBJECTIVES:

> *1. Design and develop a workplace job-related literacy curriculum based on the needs of hourly workers. The content of any courses would be based on an analysis of math and supporting reading skills required on the job and would use examples from the workplace.*

DELIVERABLE:
Reading and math job-related instructional materials for use in individualized and small group instruction. These materials may take the form of customized and commercial materials including self-instructional workbooks, videotapes, audiotapes, and computer-based instruction software.

RESULTS:

Series of workbooks "Math for Success in Electronics"

- to prepare employees to enter EPT program
- to assist employees in completing EPT program
- based on skills needed as a foundation for successful learning within the EPT curriculum

DISCUSSION:

At the onset of project, Great Lakes Steel had already initiated a five-year training plan for upskilling of the workforce. A training center was established near the plant and outfitted with the latest technical equipment. This training plan involved two major efforts. First, there was ongoing customized training of all Great Lakes Steel Workers in electronic and mechanical technical skills. Second, a program to upgrade hourly workers in electronic and mechanical areas.

This second effort is the primary thrust of the DOE project. A close relationship had been established with Wayne County Community College to develop specific customized courses to suit the needs of the Great Lakes Steel's new human resource strategy. In addition, the college had offered to GLS employees a "swing shift" schedule for their EPT curriculum. The EPT curriculum was the avenue GLS had chosen to provide upgrading of hourly workers in the electronics area.

The focus of this project was to address the educational needs of this population of GLS employees (those hourly workers who would participate in the EPT program). One major barrier to the successful completion of this technical training was the lack of basic skill literacy of the GLS workforce. A special unit of the GLS training center, Career Development Center (CDC), offered instruction and tutoring in general basic skills to the level of GED/high school diploma. This however, did not provide an adequate transition to technical training. What was needed was a literacy program specifically developed to complement technical training, contextually functional, that would give workers the necessary skills to complete technical training. The material developed was designed to complement technical training while fitting into the established GLS training structure.

II. Deliver the educational program using this curriculum to these workers through individualized programs that would meet workers educational needs and time and location constraints.

DELIVERABLES:

1) A fully operating workplace literacy program providing workers with daily individual and small group instruction and materials to achieve their educational goals

2) Individualized educational programs for each worker that would allow self-pacing and accommodate varying entry levels

3) Program Director and Instructor's Guide to include instructional strategies and practices for workplace literacy programs

RESULTS:

Workbooks were made available to students through tutors at the GLS training center and also through WCCC tutors and instructors on campus. This availability permitted an individualized self-paced approach based on students' needs.

As a result of the early analysis of the curriculum materials and program established by WCCC, the project team recommended that GLS purchase Learning Unlimited materials which address general basic skill development. The workbooks were linked back to materials produced as part of this project so there was a smooth flow from the use of one resource to the next.
A revised/expanded schedule of tutor availability at both the GLS training center and WCCC campus was established to better accommodate the time constraints of GLS workers.

A free seminar using the series of workbooks as texts is offered to WCCC students. Optimally workers would participate in this seminar before they enter into the EPT program. The initial seminar was offered to students at the beginning of their first semester in the EPT program (Sept '91).

The workbooks were tested in a variety of settings which included small group external to classtime, regular classes, a special seminar, and one-on-one tutoring. They were used as resource materials in one-on-one tutoring. In this setting, tutors used them within the tutoring session and also distributed them to students to be used as homework and reference material.

The workbooks were also distributed to students in the EPT curriculum. Here they were used as reference materials to reinforce the math skills needed in the electronics classes. A structured group discussion was held with these students at the end of the semester to get their views on the usefulness of the workbooks. A prevailing theme was the value of the materials as reference and review. The students felt the full set of workbooks should be made available at the onset of the EPT program and that they lent themselves well to individualized use.

The workbooks were also used as the primary text for a four-week seminar for entering EPT students. Here, the students (not employees of GLS) were pretested using a sample of practice problems contained in the workbooks. Additional workbook problems were used in conducting a post test at the end of the seminar. Results show that there was an average increase in scores of 36% (from 45% to 81%). Evaluation forms completed by program participants indicated that for most of the students the material represented new skills and information rather than review.

Manuals: An Administration Manual was prepared to record the history of the project and act as an implementation guide for use of the workplace literacy organizational structure that was created. An Instructor's Guide accompanying the instructional booklets to guide recommended use and to provide links to basic skill materials was also developed.

DISCUSSION:
Surveys and focus groups were conducted with GLS workers currently in the EPT program. Resulting was a series of concerns and issues GLS workers had about participating in the EPT program which provided input for the strategy and approach for program delivery.

With three months remaining on the project timeline, GLS assumed full responsibility for the program, thus taking over the service delivery from WCCC. This result indicated that GLS had learned enough about how to perform the various functions, and they were willing to fund a continuing effort.

> *III. Encourage worker participation, overcoming any identified deterrents through additional project activities such as publicity, support groups, and incentives.*

DELIVERABLES:
1) Flyers, brochures, announcements; program schedule, location, and environment that make instruction accessible to all workers who need it;
2) Administrator's Guide to include guidelines for establishing and maintaining a literacy program center.

RESULTS:
The CDC created and distributed to GLS employees a monthly newsletter, "Training Tracks", which publicized the events and services offered. A similar publication was distributed at the WCCC Downriver campus for overlapping activities. Brochures were redesigned three times a year to describe special services and hours of operation; these were mailed to GLS supervisors. Open houses were offered periodically to view the services of CDC, and a videotape was made and shown through a local cable TV outlet.

CDC placed an emphasis on confidentiality in serving the steel workers. Given the strong union backing for the center, this was a mandated requirement. Internally, CDC staff kept on going records of visits by employees and tracked their progress. Names of individuals were not available to the company or the union. Although the CDC was located in the same building as GLS technical training, its location, about one mile from the plant, did not foster easy access. All materials, including computer workstations were available to GLS employees.

DISCUSSION:
Surveys and focus groups were conducted with GLS workers currently in the EPT program. Resulting was a series of concerns and issues GLS workers had about participating in the EPT program which provided input for the strategy and approach for program delivery. Recruitment for the program remained a continuing issue throughout the project. The location and the environment were adequate, but employees still had to make a special effort to get to the facility. Because CDC people were not permitted in the plant, face to face contact with those who might use the services was limited. A detailed explanation of these activities is given in the Administrator's Manual.

IV. Determine the level or workers' participation through individual attendance and reaction, pre- and post testing, and their participation in other educational and training programs.

DELIVERABLE:

The evaluation report of Tech Prep addresses the effects of the project as well as its replicability. In examining the available information to utilize as a skill competency foundation for the instructional materials, the project team decided to create a special database that would link existing information on job tasks through basic skills. These information links are represented in the Industrial Electronics Jobs-Skills Database.

RESULTS:

The following activities were conducted: review of ASSET scores and grades of GLS group 1[1] and 2 students; create and administer questionnaires and focus groups of group 1 and 2 students; obtain student participation for material review process; develop and deliver a seminar for group 3 students using workbooks as text; obtain pre- and post testing of these students; facilitate the use of workbooks by tutors with non-EPT students; create database for general use.

DISCUSSION:

Much of the analysis to establish the overall framework for the project occurred during the first ninety days of the project. Many questions from the Steering Committee had to be answered and consensus developed among the partners. This was not achievable without a great deal of thinking out the issues and then rethinking the solutions proposed. Among the issues investigated were: what is workplace literacy; what does it mean for our context; what can each of the partner organizations learn from this effort; what are likely to be generalizable results; what evidence should we collect to determine the detailed needs of the students; what type of structure and process will work for us; how do we deliver a quality program with existing materials that are inadequate. These and other questions guided our early discussion and were invaluable in producing a smooth-running project.

Second Comparison

The following is a listing of the agreed upon scope of work signed by the participating organizations prior to the onset of the project. Because the general objectives were discussed above, some brief notes on additional points are given here.

Industrial Technology Institute (ITI) agrees to the following revised scope of work:

1. Evaluate Electrical Tech job description.
2. Evaluate Electrical Tech job performance.

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[1] These "groups" of GLS students began their EPT experiences in different years. Group 1 was started in 1989, Group 2 started in 1990, and Group 3 started in 1991. The programs take three years to complete with approximately three courses taken each semester. Each group had a minimum of 25 GLS-USWA employees.

3. Evaluate Electrical Power Technology curriculum.
4. Identify methods and specification for Tech Prep curriculum.
5. Review and recommend test instruments.
6. Develop Tech Prep curriculum with input from Wayne County Community College (WCCC) faculty and Great Lakes Steel (GLS) representatives.
7. Evaluate and select existing instructional materials if appropriate.
8. Develop and produce master copy of all instructional materials.
9. Suggest Tech Prep instructional delivery methods for faculty of WCCC.
10. Evaluate materials, delivery, impact on job.
11. Revise materials following evaluation recommendation.
12. Develop two Guidebooks (Administrator's and Instructor's) for dissemination of successful strategies from the project.
13. Report to Department of Education.
14. Serve as prime contractor: administer funds and provide required information to Department of Education.

Brief Discussion: Following substantial completion of the first five tasks above, it was determined that a clear understanding was needed to link job titles and responsibilities, through job duties, to technical training competencies, to education requirements, to basic skills. While we found pieces of this data, none of it was linked in a hierarchical fashion. This created the need for the data base. Secondly, the literacy issue at GLS was not so much what the status is now, but is the organization prepared for the future. The job descriptions, although inadequate to measure impact, were also somewhat irrelevant if jobs were to change. Basing the literacy program on current jobs was, therefore abandoned.

The database was necessary at one level of the project, and tests were needed for another. Developing original instruments was not performed because of costs, yet none of the existing instruments, like ASSET, were deemed that relevant. Thus, we decided to go with the present test at WCCC to at least yield a benchmark of entering student skill.

Throughout the project, ITI staff worked with to WCCC faculty in suggesting modifications to curriculum to bridge the gap between entry-level student characteristics and expected classroom performance. We found, for example, that many of the math materials read at Grade 14-16, considerably beyond tested capability of the students in this program. ITI also recommended the use of Learning Unlimited materials to bolster the basic skills portion of the CDC delivery structure. The resulting math-electronics booklets were based on the Learning Unlimited model.

Wayne County Community College (WCCC) agrees to the following revised scope of work:

1. Provide ITI with Electrical Power Technology curriculum materials and access to instructor's and classroom.
2. Evaluate students (individual and group) using test instruments recommended by ITI.
3. Collect student data on classroom performance (regular and Tech Prep program).

4. Provide ITI with resource persons (4 hours per week) to develop curriculum.
5. Deliver Tech Prep instruction, both classroom and training center (individualized).
6. Recommend Tech Prep program changes.
7. Maintain student records and perform support services with students.
8. Serve on Steering Committee.
9. Perform on-site administrative tasks (student recruiting, instructor assignment, conduct open houses, maintain facilities at WCCC and Great Lakes Training Center, provide child care and educational counseling if needed).
10. Assist ITI staff with data collection and instructional development regarding literacy audit, assessment of Tech Prep entry skills, analysis of organizational constraints, identification of methods and specification for instructional material development, curriculum development and material selection.
11. Provide administrative reports to ITI as required in order for ITI to meet its responsibilities as prime contractor.

Brief Discussion: A very important asset to this project was the electronics instructor of WCCC who served as technical subject matter expert, as well as the primary source of information on student needs. Throughout the project, his input was highly regarded, and it was probably the most important contribution to project success. His time on the project was increased at various stages. WCCC staff in other capacities on the project performed in accordance with the tasks given above. An important addition to the tasks above was to perform as lead in the development of the Administration Manual. This was key element in integrating and documenting the entire project.

Great Lakes Steel (GLS) agrees to the same scope of work as in the original proposal:

1. Assist ITI in collecting worker data.
2. Provide WCCC and ITI with content information and access to workers on-the-job, job description, and job performance data.
3. Recommend changes.
4. Provide space and adequate equipment for 18 months to begin June 1, 1990.
5. Elicit worker/student/company/union support for the project including recruitment of students.
6. Serve on Steering Committee.
7. Provide administrative reports to ITI as required in order for ITI to meet its responsibilities as prime contractor.

Brief Discussion: The two GLS representatives, one from the United Steel Workers of America and the other from GLS Technical Training, supported project activities and fostered cooperation throughout all phases of the project. Through their involvement, the dollar amount of match provided for the project was increased through the addition of high quality basic skills instructional materials, and toward the end of the project, the acquisition of new computer-based materials of state-of-the-art quality and utility. GLS remained receptive to suggestions for

improvement, and alternatively, consistently offered valuable feedback throughout project execution.

B. Refer to schedule of accomplishments and target dates, give reasons for slippage; include any corrective measures taken to correct slippage.

1. Steering Committee meetings - held once per month on schedule

2. Perform Instructional Analysis - on schedule (month 1 through month 6)

3. Select and Develop/Revise Materials - began during month 3 rather than month 1 because instructional and needs assessment priority and ran through month 15 because of longer than expected review periods. The initial schedule was unrealistic in this regard.

DISCUSSION:
Extensive upfront analysis was conducted before choices about material selection and development could be made. This activity did not begin until month 3.

4. Develop Program Guide - proposed timeline month 2 - month 10.

DISCUSSION:
Development of Program Guide ran behind proposed schedule due to changes in the relationship between GLS and WCCC. In the initial review of the GLS training strategies it was noted that the completion of the EPT associate's degree prepared GLS workers to pass internal examination making them eligible for job change and/or promotion. Within the timeframe of this project GLS has reconsidered their approach and is currently looking into a program which will enable their workers to work toward journeyman's status. This will expand the curriculum to include on the job training.

In addition, GLS assumed full control and on-going support of to administer the Career Development Center. With these proposed changes in the program itself, the final version of the guide has been postponed to accommodate these adjustments.

5. Develop General Administrative procedures - on schedule
(month 1 through 3)

6. Organize Facilities and Equipment - on schedule (month 1 through 4)

DISCUSSION:
In reviewing the facilities and equipment available to workers at the Career Development Center, GLS decided that a valuable enhancement to their facilities would be Learning Unlimited Material. These were purchased in month 6.

7. Recruit Participants/Publicize Program - proposed months 2 - 4 (actual month 2 -14). The process should have been envisioned as an on going effort.

DISCUSSION:
These activities were somewhat hindered due to the anticipation of substantial program changes and the change in the relationship between GLS and WCCC. In anticipation of the Journeyman's program it was first considered to postpone the group 3 students into the EPT program until the details on needed changes had been worked out. Nevertheless, both GLS and WCCC did publicize throughout the workplace and on campus the tutoring and skills enhancement opportunities offered at CDC and on campus. Fliers were distributed, news releases were generated, high schools and other plants were notified of the availability of the "Math for Success in Electronics" seminar, offered free.

8. Develop Participant Support Service - months 2 through 8. Because of greater attention given to initial analysis tasks and development of a general structure, support service development began later than expected. Some activities were in place earlier and more were added toward the end of the effort. Flexibility of time and location of services took priority. No ancillary services were developed, nor were they deemed appropriate for this project.

9. Develop Detailed Procedures for Administration and Record Keeping - month 4 through 7. Developed and refined according to schedule.

10. Deliver Instruction - did not start at month 2, as proposed

DISCUSSION:
Given the nature and process of material development the initial proposal of instructional delivery beginning at month two is unrealistic. Thorough assessment and analysis was conducted before the form and content of the materials was decided. Material development included review and revision process which included participation by students, tutors, instructors, and GLS personnel. Final drafts of materials were used by the tutor beginning month 8. A seminar using the final version was held during month 15.

C. Identify number and characteristics of project participants who completed planned project activities and those who did not, and the outcomes achieved by participants.

1. Questionnaire for literacy audit: GLS group 1 and group 2 students -19 responses

> Characteristics: 35 from group 1; 33 from group 2
> GLS workers, currently enrolled in the EPT / GLS program at WCCC; group 1 was beginning their third year and group 2 their second year of the program; all adults with a median of 15 years work experience; ASSET test scores were available for 55 of the students showing very low scores in math and slightly below average scores in English/reading

2. Focus Group Participants - Nine group 1 and group 2 students

Characteristics: two focus groups were conducted to verify results of questionnaire on literacy audit, and to determine what assistance was needed; suggestions were made concerning the overall structure of the program including support from the union and company, recruiting procedures, hours of operation, and current resources available

3. Seminar using Workbooks

14 group 3 students beginning their first year of EPT; given pre and post tests showing a 35% increase in scores

4. Anticipated tutorial distribution with EPT students

123 contacts ranging from 30 minutes to 4 hours

5. Review of workbooks within development process

62 GLS/EPT students reviewed the content and process for all workbooks, critiqued all sections, worked through the exercises and completed detailed evaluation forms with suggestions for improvement

6. Students using Workbooks through tutor distribution

38 contacts with GLS-EPT students at CDC
2 GLS workers not enrolled in EPT (walk-ins to CDC)
21 from general WCCC student population at Downriver campus not enrolled in EPT

7. Student using workbooks through instructor distribution

15 students from regular electronics class who were instructed to use materials in response to low test scores

Discussion: The Evaluation report and the Administrator Manual contains detailed information on data collected and analyzed.

D. Dissemination Activities

Our dissemination plan embodied the concept that other organizations wishing to duplicate the type of activities should have a clear understanding of our experiences. Furthermore, the audiences we needed to address were more than the traditional educational agencies, and they were more national in scope than local. To that end, we presented our experiences and showed example products at the following professional meetings.

1. Contance DeVantier and Judith Robinson (ITI): "Meeting the Literacy Needs of Steel Industry Employees" at the American Technical Education Association Conference in Atlanta in March, 1991.

2. Dale Brandenburg (ITI): "The Great Lakes Experience" presented at the June, 1991 conference, Voices & Visions in Literacy, the Michigan State Literacy Conference in Lansing Michigan.

3. Dale Brandenburg (ITI), George Lakkis (WCCC), Jim Borowski (GLS) and Brian Diedrich (USWA): "Workplace Literacy at Great Lakes Steel--Partnership for Results" presented at the American Society for Training and Development Technical/Skill Conference, October, 1991 in Cincinnati, Ohio.

In addition, we have copyrighted the materials produced using the names of all partner organizations. Over the next few months, we will pursue duplication and commercial dissemination of the instructional booklets and Instructor Guide as a first priority. We will do likewise for the database as a second priority. All materials will be submitted to the three national dissemination networks requested by the Program Officer.

These deliverables are as follows:

A. "Math for Success in Electronics": A set of 30 self-instructional booklets and an Instructor's Guide to accompany their suggested use.

B. "Industrial Electronics Jobs-Skills Database": A set of two diskettes containing the database and a User Guide to accompany its recommended use.

C. "Administration Manual for Workplace Literacy Programs": A case history of the Great Lakes experience with recommendations for implementation of similar efforts.

E. Evaluation Activities

Evaluation activities were conducted independently by two ITI staff whose report accompanies this final report. The majority of activities were designed to complement the developmental nature of this effort, and they did not emphasize job relevant outcomes. The data collection activities centered on achieving high quality instructional materials, an evaluation of the process of putting in place a workplace literacy program, and the satisfaction and achievement of the workers who participated in the program. A key ingredient to view evaluation is that of organizational learning, i.e., did both Great Lakes and Wayne County Community College learn sufficiently well to take over the effort independently or learn enough to do it better at the next opportunity. Our view is that organizational learning is a far more important element than counting the number of students served during an 18-month start-up venture. The critical factor should examine whether or not a viable system was set-up and the extent to which it can be replicated elsewhere. In this case, GLS is continuing to run a viable program and WCCC has acquired the requisite capacity to create other partnerships. Future students will reap the benefits of the foundations established by this project.

F. Report on changes in Key Personnel

There were no significant changes in personnel throughout the project that impacted directly on project performance with the exception of a change in the leader of the evaluation effort from ITI. In that case, Dr. Jon Morell replaced Dr. Joe Martelli very early in the effort (Month 3). This change had no impact on the evaluation activities because it occurred early enough in the overall activities.

EVALUATION REPORT

U.S. Department of Education
Office of Adult and Vocational Education
National Workplace Literacy Program

Grant Number: V198A800020
Recipient: Industrial Technology Institute, Ann Arbor, Michigan
Organizational Partners: Wayne County Community College (Downriver Campus)
and Great Lakes Steel Division of National Steel Corporation
Submitted by: Jonathan Morell, Judith Robinson, Industrial Technology Institute

APPROACH TO EVALUATION

There were two main components to evaluation activities. One concentrated on administrative activities, the second on use of the materials.[1]

ADMINISTRATION EVALUATION

The purpose of administrative evaluation activities was to assess the administrative procedures at project start-up, recommend any suitable adjustments which would enhance student participation and success in the EPT program, and monitor the smooth progression of project activities. To this end, an "Administrative Needs Assessment" was conducted.

The focus of the needs assessment was the current status of the EPT program and the support mechanisms in place for GLS/USWA employees. Data collection activities included:

- a questionnaire administered to students in the Electronics Power Technology (EPT) program, jointly administered by Great Lakes Steel and the United Steel Workers of America (GLS/USWA);

- an EPT student focus group, also jointly administered by GLW/USWA;

- GLS/USWA representatives;

- a review of GLS/USWA five year training strategies; and

[1] A third element of evaluation, "materials development" is addressed in the Administrative Manual as part of the total materials design and development process.

- interviews with Wayne County Community College (WCCC) staff, including: instructors, tutors, the Career Development Center (CDC) administrator, the Electronics Program Director, and the Dean of Downriver Campus.

NEEDS ASSESSMENT FINDINGS:

The EPT program had been promoted as preparation for progression through the electronics crafts trades. This progression, however, was not reflected in the formal GLS/USWA five-year training plan. Existing steps in the plan for progression did not incorporate any clear or direct incentives for completing the three year EPT program. Rather, progression up the trade ladder was based upon the successful completion of tests and an prescribed number of hours worked. Though the EPT program could definitely help an employee obtain the knowledge and skills to pass the required tests, there was no direct linkage to EPT completion and crafts progression articulated in the training plan.

Our analysis of CDC's educational support opportunities, facilities and equipment revealed a wide range of academic opportunities starting with the most basic literacy skills and proceeding through to high school completion. Time management programs, study skill education, and individual tutoring were also available. One important gap was discovered. There was a lack of specific training to address the preparatory skills needed for EPT technical training.

A review of EPT registration procedures for GLS/USWA employees revealed the GLS/USWA relationship with WCCC had initially fallen under the guise of "contract training". Thus GLS/USWA employees had not followed WCCC general registration procedures. As a result they had not participated in the usual process of assessment and counselling which precedes general enrollment. This also sidestepped the Electronics Department's prerequisite for EPT program entry. The lack of up-front assessment for GLS/USWA employees meant that there a was a good probability for them entering the program without the educational foundation necessary to succeed.

The lack of necessary prerequisite skills of entering EPT students was a major theme expressed by EPT course instructors. Many felt the need to supplement course-work with instruction and review of basic math concepts needed to accommodate the EPT course curriculum. This theme was also brought up in the focus group discussions with GLS/USWA EPT students. Many felt they would have struggled less with course work had they had the opportunity of up-front assessment and recommendations for needed skill requirements.

Students also revealed the financial burden placed upon them because of the exiting system for tuition reimbursement. First, the system allowed reimbursement for classes taken within the EPT curriculum, but not for those remedial math or english courses that may be recommended as necessary before entering the program. As a result employees were less likely to take those needed courses. Secondly, the turnaround time between reimbursement for one semester was not quick enough to

allow employees to use those moneys as payment to the college for the following semester. So even though employees knew they would eventually get reimbursed, they needed to have in place two semesters' worth of tuition (of their own money) set aside in order to accommodate the college's time frame for class registration.

PRESENTATION OF FINDINGS TO GLS/USWA

Findings in the form of flow charts, graphs, and a list of "Issues for Consideration" were presented to the project steering committee. The flow charts and graphs highlighted:

1) the current and ideal representation of program administration;

2) the match between GLS/USWA job tasks and EPT curriculum;

3) progression through the Electrician craft; and

4) the placement of the proposed project intervention within the total GLS/USWA training structure.

With these aides the committee had the opportunity to look at the "total picture" of the entire training initiative, and thus easily identify gaps and areas of needed adjustment in administrative processes.

The "Issues for Consideration" contained sections addressed to CDC, WCCC, and GLS/USWA. The document was not developed as a set of specific recommendations, but as a list of concerns which each organization had to consider within the context of its unique set of structures, goals and objectives. The intention of the document was not to provide "quick fixes". Rather, it was a foundation for incremental adjustments which could be made, as opportunity allowed, over the course of the project. The following summary of the topics covered in the document provides a sense of the problems that were discovered and the suggestions that were offered.

CDC:

- change CDC hours to better accommodate employee work schedules

- provide more privacy for tutoring sessions

- eliminate the use of the term 'basic skills' when dealing with adult learners

- develop an orientation program for entering EPT students

- consider acquisition of programmed self-paced instructional materials that would cover grade 2 level through to high school proficiency level (Learning Unlimited)

WCCC

- enforce EPT admission criteria

- make more tutors available on campus

- ensure that laboratory facilities are adequate

GLS/USWA:

- revise tuition reimbursement procedures to decrease the financial burden to employees

- consider revising the criteria covering courses eligible for reimbursement to included remedial courses recommended as a result of assessment and counselling

- do better promotion of the assessment and preparatory services offered by CDC

- xpand recruitment efforts to identify prospective EPT enrollees early enough to utilize assessment and preparatory services

- show more visible company support for the program.

Constructive changes did come about as a result of the presentation of the above data. GLS/USWA was prompted to revise their approach to preparing employees for the Electronics trade. A journeyman's program in now being put into place. It will include both academics and on-the- job training. This approach will also tie in directly to GLS/USWA'S revised process for progression and advancement within the trade.

GLS/USWA also responded to their employees' concerns about the financial burden resulting from the present system of the tuition reimbursements. Plans have been made to increase the turnaround time between course completion and reimbursement payments, so employees will have money available to register for the coming semester.

Recruitment and publicity for all CDC offerings remain an area of focus and concern. GLS/USWA together with CDC management have proposed much more aggressive approaches for recruitment. They include CDC personnel going into the plant proper to promote opportunities available and messages included in employee pay stubs. Announcements in the Training Division newsletter and local cable television announcement continue.

CDC did purchase the Learning Unlimited materials. This set of materials will provide for a consistency in the framework and format of learning materials over a broad range of educational levels.

The administration of CDC was no longer contracted out to WCCC. This was taken over by GLS/USWA Training Division.

USE OF MATERIALS

The needs assessment fed into the development and design of instructional materials in two ways. First, the needs assessment provided an overview of the existing training structure offered to GLS/USWA employees and allowed the design team to fashion their intervention to incorporate smoothly into this existing framework. Second, educational issues were identified. These became the emphasis area for the instructional design team.

As a result of the needs assessment it was decided to develop a set of technical preparation materials for GLS/USWA employees which would prepare them to enter the EPT program, and thus help assure their success in completing the program. The materials would take the form of a series of booklets (titled "Math for Success in Electronics") which would address math and problem solving skills necessary for dealing with EPT courses. Each booklet would be topic specific, and address only one specific skill. Each would include three sections: 1) vocabulary 2) methodology, and 3) practice problems. The booklets would be designed for individual, dyadic and small group use.

The evaluation of these materials considered their appropriateness in three contexts - individual use by students, use during one-on-one tutoring; and use as text material in a small group seminar.

INDIVIDUAL USE BY STUDENTS

During this phase evaluation focused upon the general format of the booklets and their appropriateness for independent use. Near final drafts of the booklets were distributed to students during the semester, to be used by each as he or she saw fit as a learning aid. Data collection was by means of a group discussion (during class time) with EPT students who had used the workbooks on their own for as-needed support during the course of a semester. The "group discussion" approach was chosen because of sensitivities to end-of-semester time pressures on students, which precluded the use of questionnaires or individual interviews. The discussion format also allowed for the possibility of a whole range of comments and criticisms in areas not foreseen by the design or evaluation team. Questions presented for discussion included:

-how each student used the booklets

-appropriateness and applicability of the topics covered in the booklets to actual course-work

-ability to understand the definitions and to work through practice problems independently

-amount of time taken to go through the booklets

-sections of the booklet proved to be most useful

-general comment or criticisms

General student consensus was quite positive. Students indicated that the booklets lent themselves well to independent usage. Most felt the materials were easy to understand and follow. They pointed out that the processes covered and explained in the booklets worked well to lay the foundation for and thus clarify concepts covered in the course texts.

Students also appreciated the format of the workbooks. The separate sections for terminology, methodology and practice problems allowed them to easily use all or just parts of the booklets as they deemed appropriate.

The students suggested that the entire series be made available to all students as the enter the EPT program. This would allow for easy reference and review of basic mathematical concepts as they came up in the context of electronics and physics course-work.

There were some concerns about the consistency of particular definitions and process methodologies with those in course texts. These concerns were relayed to the design team and appropriate adjustments were made.

USE DURING ONE-TO-ONE TUTORING

In this phase the materials were used in a one-on-one tutoring situation. Particular attention was paid to how the materials were used by the tutors - as primary resources or with other materials. Data collection was be means of a form completed by tutors who used the booklets.

An important difficulty encountered was that tutors based at CDC and WCCC did not encounter a sufficiently large number of EPT students whose skill needs were matched the material in the books. Rather, the majority of the "presenting problems" dealt with higher level mathematical difficulties. While this speaks well for the students already in the EPT program, it made it difficult to evaluate materials targeted for

students at an "EPT preparatory level".

In order to get some information the value of the materials for the target audience, the scope of students encounters was expanded to include the general WCCC student population at the Downriver Campus. As a result, 21 of the 23 evaluation forms completed by tutors were generated from tutoring sessions with students outside the EPT program. These students ranged from EPT students to nursing students to business students who all needed strengthening in basic mathematical concepts.

Again, first drafts of the materials were distributed to CDC and WCCC tutors to be used in one-on-one tutoring sessions. After a particular skill set had been mastered by a student, the tutor completed an evaluation form indicating how the workbook was used with the student.

Tutoring evaluations revealed that the major use of the booklets was in conjunction with other resources. Tutors found the booklets' format worked well for separating out different sections of the workbooks for use as each individual situation dictated. Though the terminology section of the booklets was quite specific to the electronics field, the methodology and practice problems sections were quite useful across a wide variety of students.

USE AS COURSE MATERIALS

This phase looked at the booklets' use as text materials in a small group setting. (Unlike the previous data collection, final versions of the booklets were used here.) The setting was a workshop held for entering EPT students at WCCC during the first weeks of Fall Semester of 1991. The participants should have been give a standard math course as a prerequisite to program entry, but who were not offered this option because of scheduling problems. Because of the mathematical skill of the workshop participants, this setting proved the best test of the value of the booklets for the type of audience originally envisioned.

Data collection was through a pre- post test method and evaluation forms collected at the end of the workshop. The instructor took a sample of practice problems from the texts to compose the pre-test at the seminar's start. The average test score for the 14 attendees was 45%. At the close, a post-test was given, again from a sample of practice problems in the workbooks. This time the average score equalled 81%.

These same student also completed a ten question evaluation at the end of the seminar. They were asked to rate on a five point scale, whether they found the seminar useful; if the individual parts of the workbook were understandable and/or useful, and if they would recommend the seminar to others. All of the students rated the usefulness of the booklets highly. On the five point scale, with 1 being 'not at all useful' and 5 being 'extremely useful', 50% rated the booklets 4, and 50% rated them 5. Questions referring to the individual sections of the booklets received similar high ratings. None

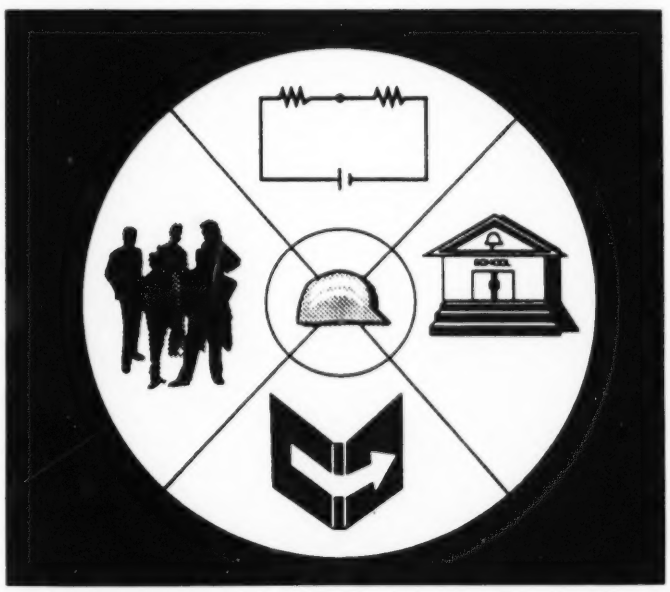
received any rating below 3. All respondents indicated that the seminar had been helpful in preparing them for EPT coursework. These responses fell within the 3 to 5 point range on the 5 point scale, (with 'somewhat helpful' at 10% to 'extremely helpful' at 30%). The majority of respondents (66%) also indicated that the seminar covered new skills and information. The full 100% of the respondents indicated they would recommend the seminar for others entering the EPT program.

OVERALL FINDINGS:

Results from all three phases of the evaluation suggest the materials worked well in a variety of learning situations. All three phases of the evaluation produced feedback on the ease of use of the booklets based upon their format and structure. The three distinct sections of the booklets 1)vocabulary, 2) methodology and 3) practice problems were a particularly strong feature, as were the modularity and topic-specificity of each workbook. While circumstances did not allow a rigorous test of the workbooks for their originally intended audience, it is clear that the format and material covered is valuable for a variety of educational settings.

Skills
Enhancement
Program

Administration Manual



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FOREWARD

The professional and personal experience the Workplace Literacy Project afforded its team members is not easy to summarize. Our process for achieving a shared vision to enhance the skills potential of a workforce was met in many ways that are not described in this document. We learned that teamwork is essential where so many objectives need to be met. Our partnering made the endeavor worthwhile providing a unity of purpose that overshadowed initial program problems, delayed time lines, and budget considerations. We hope this manual will benefit our colleagues in developing Workplace Literacy Programs and provide a reference for organizations seeking partnerships to fulfill a common mission.

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INTRODUCTION TO ADMINISTRATION MANUAL

The purpose of this Administration Manual is to provide a reference that can serve as a useful tool in the development and administration process of a Workplace Literacy Program. The manual presents a top down approach. Based on our experiences, recommendations are offered to facilitate a flexible process designed to meet the needs of those interested in developing a Workplace Literacy Program.

The first part of the manual cites the evolution of upgrading the skills of the United Steelworkers of America workforce of Great Lakes Division, National Steel Corporation located in Ecorse, Michigan. Moreover, the formation and implementation of the Career Development Center and the partnerships involved are presented.

The second part of the manual documents the National Workplace Literacy Project funded by the U.S. Department of Education. This project was linked to the existing Career Development Center at the Great Lakes Training Center and the Electrical Power Technology Program at Wayne County Community College. The focus of the project was to prepare workers to enter Associate Degree Programs.

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DEMOGRAPHICS OF GREAT LAKES DIVISION, NATIONAL STEEL CORPORATION

In 1929, National Steel Corporation was formed through the merger of three industrial giants: Great Lakes Steel (GLS), Weirton Steel, and M.A. Hanna Co.

The GLS Division is located on 1,100 acres in the cities of Ecorse and River Rouge (Michigan) and currently employs approximately 4,700 people. Its strategic location along the Detroit River gives it access to lake, rail and highway shipping.

Today, GLS Division is Michigan's largest steel producer. It is a leading supplier of flat-rolled steel products to the automotive, appliance, container, service center, and piping and tubing industries. Customers are benefitting from more than a $700 million in new steelmaking technology and capital improvements made by National Steel in the mid to late 1980s.

GLS suffered serious economic problems in the 1970s and 1980s due, in part, to a lack of competitiveness, quality, and productivity. In 1980, over, 4,000 of the 12,000 GLS workforce were laid off. 1982 was the worst year in the steel industry and National Steel. Employment was reduced to 5,220. NKK, the second largest steel company in Japan, purchased 50% of National Steel in 1984. To address the problems regarding competitiveness, quality, and productivity, GLS concentrated on a $700 million modernization of equipment. This resulted in GLS becoming one of America's most technologically advanced steel mills. Automated steel production and a preventative maintenance system are two of the major changes which began to take place in 1989. In 1990, NKK acquired an additional 20% interest in National Steel. For additional information regarding workforce development issues (See Appendix A).

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JOB ANALYSIS AND TRAINING AT GLS

Prior to 1959, there were no formal entry requirements for new employees. For many years, jobs were plentiful and all who applied were hired. In 1959, a written test covering basic math and reading was used to screen prospective employees. Since 1990, prospective GLS employees must be high school graduates or possess a GED certificate. They are required to pass reading and math sections of the Adult Basic Learning Examination (ABLE) with a minimum score in the 6th stanine. Approximately 40% of the applicants do not meet this criterion. This screening has insured basic skill levels of new employees.

The GLS classification system for trade and craft jobs begins with Helper, and progresses to Class C, Class B, and then Class A. Proficiency tests and written tests were the means of upgrading job classification. No worker had been required to take tests for a helper classification. It soon became apparent that workers were not adequately learning new skills with only on-the-job training (OJT). Contributing factors were: resistance to training a possible replacement by a fellow worker and partiality, not giving equal attention or opportunity to everyone. Formal training was developed to supplement OJT. Originally, individual departments hired trainers to conduct pure craft training. The quality of the training provided by this method was not consistent. The GLS Training Department worked in conjunction with a community college to provide a uniform quality of training by using community college personnel. Later, community college instructors came to the site to train.

The system of classifying jobs at GLS has evolved over the years (See Figure 1). In Trades and Crafts, Helpers must take a mandatory test if they wish to progress to Starting Rate or C Class. Then 1,040 hours of OJT (approximately six months) are required before they are

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eligible to test for the Intermediate Rate which is roughly B Class. Another 1,040 hours of OJT is required before the test for Standard Rate or A Class, can be taken. (This simplified description omits many other criteria which are not pertinent to this manual.)

Great Lakes Steel Progression Chart for
Electrical and Electronic Job Upgrades

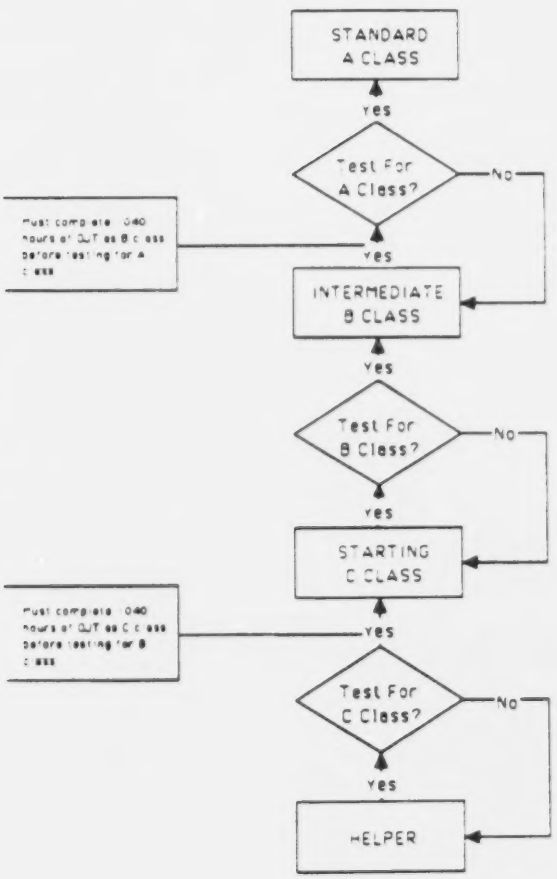

Figure 1

The task of creating a new workforce began in 1986. The need for a Skills Enhancement Program was precipitated from a 1986 contract agreement which called for craft combinations. GLS had 78 skilled-trade job classifications. Through craft combinations the number had been

reduced to 16. This meant, for example, that all maintenance employees would be called on to perform jobs for which they had no experience or training. Job performance would include reading, understanding, and making reports on Standard Operating Procedures (SOPs) and Standard Maintenance Procedures (SMPs). **MANDATORY** technical training programs were developed to meet the needs of this new situation. Technical training programs were set-up in Mechanical, Electrical, Welding, Basic Math, Electronics, Instrumentation, Microcomputers, Mechanical Drawing, and Refrigeration. **MANDATORY** training for organizational development included Safety and Partnership Training. Also in this category, but not mandatory, was Crew Coordination training.

Once training programs began, it became apparent that a basic skills problem existed. Training instructors reported that some of their students did not have the basic reading, writing, and math skills to complete the training successfully. The demographics of the workforce were investigated in 1987, and it was learned that approximately 890 of the 4,000 mill workers did not have a high school diploma. Approximately 25% of those without a diploma had not completed eighth grade. The average age of GLS employees was 44 with approximately 20 years seniority. Many employees had been hired before any minimal testing or educational standards were in place.

Also negotiated in the 1986 contract was the "Cooperative Partnership" management process which set the stage to change the traditional autocratic style of management at GLS to an employee involved style where "employees at all levels in the organization meaningfully participate in decision making . . . . This is particularly critical among the working groups at the shop floor level where there must be a high degree of cooperation and commitment between

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management and the bargaining unit employees[1]." Historically, mill workers were hired to be strong backs and not voice opinions or make decisions; now, many are required to read instructions, make adjustments, and report those adjustments in a written form. These factors brought about a fundamental restructuring of the workplace at GLS.

In 1987, a Self Improvement Plan was implemented to provide employees with one year of service an opportunity for job-related self improvement. Upon successful completion of approved courses at specified community colleges, employees are reimbursed for tuition, material and equipment fees, registration fees and textbooks.

With these fundamental changes beginning, union and management training personnel jointly began to investigate Workplace Literacy Programs. The June, 1989 contract provided for the formation of a Career Development Institute. The contract reads, "In establishing this Program USWA and National are implementing a shared vision that workers must play a significant role in the design and development of their jobs, their training and education, and their working environment. In a world economy many changes are unforeseen and unpredictable. Corporate success, worker security and employee satisfaction all require that the workforce and individual workers be capable of reacting to change, challenge and opportunity. This, in turn, requires ongoing training, education and growth. Experience has shown that worker growth and development are stunted when programs are mandated from above but flourish in an atmosphere of voluntary participation in self designed and self directed training and education. These shared beliefs shall be the guiding principles of the USWA/National Career Development Program[2]."

---

[1]May 1, 1986 Agreement, Great Lakes Division, National Steel Corporation and United Steelworkers of America, 1A.30.

[2]June 1, 1989 Agreement, Great Lakes Division, National Steel Corporation and United Steelworkers of America, Q.7.

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The Institute included the following steel companies and their respective divisions:

National Steel Corporation

Inland Steel Corporation

LTV Steel Corporation

Bethlehem Steel Corporation

Armco, Incorporated

U.S. Steel, USX Steel Corporation[3]

National Steel was to contribute at least $150,000 per month to the union/management administered fund beginning in June, 1989. Though the actual program called for by the language of the contact was not yet implemented, it was interpreted that self improvement was one of the items the fund was to finance.

Union and management representatives made informational visits to various UAW workplace programs. The goal of the visits to these operational programs was to become familiar with their program formats. Information about the actual location of the programs on-site, employee accessibility, hours of availability, necessary equipment/materials, and course offerings were gathered to better understand the possibilities under consideration in the formation of the GLS/USWA program.

The data gathered from the informational visits was remarkably similar because the only programs visited were sponsored by union and management of large automotive companies.

The goals and objectives of the GLS/USWA program were never formally stated, but it

[3] Not an original member of the Career Development Institute.

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was understood by all involved that a basic educational program encompassing all levels of math and English/reading instruction was necessary.

Soon after the visits, union and management representatives contracted the services of Wayne County Community Colleges (WCCC) Corporate Services Office, and Dr. Ruth Goldman of WCCC to set-up a program for GLS/USWA. This decision was based on Dr. Goldman's experience with Ford Brownstown's Skills Enhancement Program. Dr. Goldman designed the program for the GLS/USWA Career Development Center that included:

- All levels of Math instruction
- All levels of English/reading instruction
- Bridge to College
- English as a Second Language

The doors of the GLS/USWA Career Development Center opened for business in November of 1989. The Career Development Center was located in the Great Lakes Training Center. This site required nearly all interested participants to drive between one and three miles from their point of entry/exit of the mill. The Training Center is the site of much trade and craft training. At the end of August 1990, 100 employees had come to the GLS/USWA Career Development Center. Efforts were made to offer a wide range of services in the educational field. English/reading instruction was offered Tuesday and Thursday from 1 p.m. to 6 p.m. Math instruction was offered Monday and Wednesday at the same time. The facility consisted of an office for clerical and administrative staff and one classroom for instruction. The classroom was furnished with tables and chairs and six study carrels for privacy. Four computers, equipped with a variety of software, lined the back wall of the room. Unfortunately,

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there was no way to keep instructor/participant conversations private if more than one participant was in the room.

In September 1990, GLS/USWA again contracted the services of WCCC for their Career Development Center. Changes to the contract included doubling the hours of instruction and separate classrooms for Math and English/reading. Instructor hours were staggered to accommodate morning and late afternoon participants. At the end of the second year 153 employees participated in the program.

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SET-UP OF A WORKPLACE LITERACY PROGRAM

The GLS/USWA Career Development Center, provided by WCCC included the components noted in Figure 2.

COMPONENTS TO A WORKPLACE LITERACY PROGRAM

A.	RESOURCES
B.	BUDGET
C.	LOCATION/SPACE
D.	INSTRUCTORS/STAFF
E.	COURSE OFFERINGS
F.	SCHEDULING
G.	INITIAL STAFF KICKOFF MEETING

Figure 2

Resources

In 1989, GLS/USWA partnered with WCCC to set-up and administer their Career Development Center. Initially, GLS provided the funds to set-up the Center. At the end of each contract year (1989, 1990) with WCCC, GLS/USWA submitted justification of expenditures for the Career Development Center, and GLS/USWA requested reimbursement from the Career Development Institute. The GLS/USWA Career Development Center resource procedures remained the same for the first and second contract years. Beginning September 1991, GLS/USWA began to administer the Center without subcontracting the services of WCCC. This decision was based, in part, on monetary considerations.

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Discussion

Funds to support your program can be derived from various sources including unions, corporations, foundations, and state/federal grants. Information on the availability and qualifications of grant funds can be obtained from local state, and federal funding agencies. The State or U.S. Department of Education, secondary and post secondary schools, and private industry councils are also sources.

Budget

Preparing a budget is a challenging component of a Workplace Literacy Program. The GLS/USWA Career Development Center is based upon a yearly negotiated contract. During the first year of the GLS/USWA Career Development Center set-up, costs concentrated on administration and equipment. In the second year, instructional materials and instruction were the focus of the program (See Figure 3).

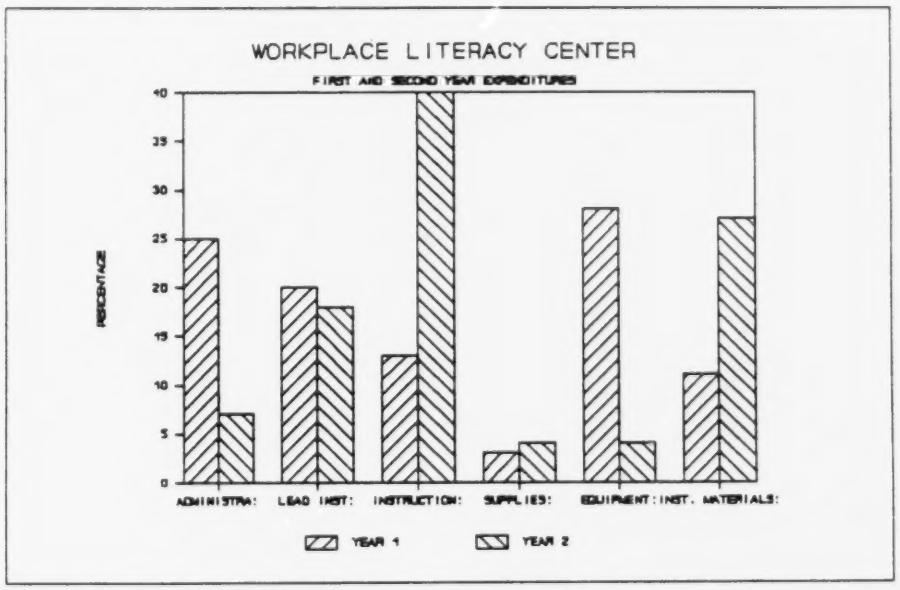

Figure 3 (Note: Percents are approximate)

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Discussion

Your first budgetary consideration is total program dollars (matched, awarded or contributed). The second consideration is the length of your program. Set-up will vary from program to program, but one can expect an initial investment of $100,000 or more. All program requisitions involving equipment, materials and supplies need to submitted on a timely basis (e.g., three months prior to the beginning of a program is suggested). This will allow sufficient time for delivery of orders, equipment installation and training, and set-up of materials and supplies.

The budget must be consistently maintained and monitored by the program director. If all program partners agree, it may prove beneficial to extend the total budget (excluding granted monies), by as much as 20% to allow for unforeseen expenditures and possible hidden costs. The additional extension to the total budget will also cover line item budget adjustments. For example, hiring of additional instructors or hardware and software purchases requested after the initial set-up.

Location/Space

GLS/USWA spent considerable time and effort deciding where to house their Career Development Center. The foremost factor was the receptivity of the Center by the employees. Unfortunately, some GLS employees are intimidated by basic skills improvement even though this is a negotiated benefit for them. If the Center was housed in the mill or on company grounds, participants may be concerned that co-workers and supervisors would see them go to the Center and know that they were attending to improve basic skills. GLS/USWA chose to house the Career Development Center in the existing GLS Training Center located off company grounds. Their intention was to place the Center in the same building as technical training so

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that more employees would participate.

The goal is to expand program offerings to include personal budgeting, retirement planning, (etc.). It is hoped that additional programs will increase participation. The additional program options may also serve as a lure for employees who need basic skills improvement. For example, an employee may come to the Career Development Center for personal budgeting and feel comfortable enough to use the Center as a resource for other learning needs. As acceptance of the Career Development Center grows, GLS/USWA may move the Center into the mill or just outside the mill, located in trailers.

Discussion

Finding an affordable location for a program requires advanced planning. A few options that will aid in the efforts to obtain a cost-efficient site are:

- Leasing
- Buying
- On-site program implementation

Factors for selecting a site are:

- Cost-efficiency
- Accessibility
- Adequacy of space

The leasing option can be beneficial for pilot and partnership programs. If a permanent site is planned or under construction, leasing is a cost effective strategy. Also, to reduce operational costs, program partners may share leasing costs. Buying a building is initially the most expensive option, but program longevity may balance the initial capital investment.

Easy access for participants should be considered in locating a program site. A location

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within three miles of the worksite will encourage optimal participation. On-site programs (located on company grounds) generally produce the highest participation as demonstrated by the Ford Brownstown and GM Hydramatic Skills Enhancement Programs. Participants are given flexibility to use the learning center before/after work, or during lunch breaks. The amount of space necessary will be determined by the size of your program. Also, an office housing student records, program files, phone, materials, supplies, staff, (etc.), should be provided in a separate room.

Instructors/Staff

Hiring qualified instructors and staff are essential to a Workplace Literacy Program. For the first year of the Center's operation, instructors and staff were recommended by Dr. Goldman of WCCC. GLS/USWA in turn interviewed and approved the individuals. In the second year, no personnel changes were made.

These individuals are the immediate representatives of the Center and were selected based upon specific criteria. Instructor criteria included:

- Experience working with adult learners
- Bachelors degree (Masters preferred) with a teaching certificate in math or English/reading
- Experience working with students at different levels

The staff/clerical support criteria included:

- Clerical and organizational skills
- Experience working with an educational provider (preferred).

Finally, the instructors and staff had to possess positive work attitudes and strong

commitments demonstrated by helping the learner in any way possible. These attributes encouraged participation and retention.

Course Offerings

Initially, course offerings at the GLS/USWA Career Development Center were based on the recommendations of Dr. Goldman. In general, all levels of English/reading and math, bridge to college, and English as a second language were offered. After the first year of operation, modifications were made based on instructors observations, and the needs of participants. Modifications included additional software, a computer fundamentals course, and study skills, test taking skills, and critical thinking handouts.

Scheduling

The GLS/USWA Center's first year schedule was based on available funds and the recommendations of Dr. Goldman. There was a total of twenty hours of instruction per week, ten hours for English/reading and ten hours for math. Only one room for instruction was available therefore, the schedule was staggered so that only one subject was taught at a time. In the second year, the hours for instruction were doubled and two rooms were available for instruction. This meant that the subjects could be taught simultaneously.

Discussion

A scheduling factor that warrants consideration is the ability to accommodate all work shifts (days, afternoons and midnights). Office hours must correspond to the course offerings. The staff/clerical support should be scheduled during regular office hours to ensure proper servicing of participants. Instructors should be assigned days and times to coordinate with the schedule. (See Figure 4)

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Sample Schedule

D = DAY SHIFT 7:30 A.M. - 3:30 P.M.
A = AFTERNOON SHIFT 3:30 P.M. - 11:30 P.M.
M = MIDNIGHT SHIFT 11:30 P.M. - 7:30 A.M.

M O N D A Y W E D N E S D A Y F R I D A Y	
E N G / R D G 9 - 1	M A T H 1 - 5
A / M	D / A / M
OFFICE, STAFF, AND CLERICAL HOURS 9 - 5	

T U E S D A Y T H U R S D A Y	
M A T H 9 - 1	E N G / R D G 1 - 5
A / M	D / A / M
OFFICE, STAFF, AND CLERICAL HOURS 9 - 5	

Figure 4

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Initial Staff Kickoff Meeting

A formal initial staff kickoff meeting for the opening of the GLS/USWA Career Development Center did not occur. However, informal meetings and exchanges of information between GLS/USWA and WCCC was facilitated during contract negotiations and subsequent phone calls.

Discussion

We recommend a formal kickoff meeting to be held before the opening of a Workplace Literacy Program. Attendees include all program personnel and stakeholders (instructors, staff, sponsors, company, union, educational provider). Any questions or concerns regarding administration or implementation of the program are brought to the table for group discussion.

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ADMINISTRATION AND IMPLEMENTATION OF A WORKPLACE LITERACY PROGRAM

Recruitment/Publicity

Recruitment has been one of the most frustrating issues faced by all involved with Workplace Literacy Programs. Unlike many automotive programs where Center staff can go on the shop floor to personally recruit participants and distribute information, the Career Development Center staff did not enter the steel mill due to safety considerations. This meant that recruitment and publicity were presented in a printed format. Though technical classes were visited by staff at the GLS Training Center, there were seldom opportunities available to raise awareness of the Career Development Center through personal contact.

Though national figures relate that only about 3% of bargaining unit employees who have access to educational programs in the workplace make use of them, effort is constantly being directed toward increasing enrollment[4]. Employees face time constraints with job and family, unpleasant memories of previous educational experiences, and embarrassment and/or difficulty facing their educational deficit. Employees are also caught in the midst of a changing economy and an advancing technology that disrupts the balance they have tried to maintain in the workplace.

Three times per year, the Career Development Center designs and sends brochures, describing programs and services available, to the homes of all bargaining-unit employees. The brochures are updated constantly to reflect the new acquisitions of materials, software, (etc.) at the Center. Because the Career Development Center is located in the GLS Training Center,

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[4]Sarmiento, A. & Kay A., 1990. Worker-Centered Learning: A Union Guide to Workplace Literacy. AFL-CIO Human Resources Development Institute.

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flyers and banners are posted throughout the building. Articles about the Center have appeared in the local union publication, "Steelworker 1299". The GLS Training Department's monthly publication, "Training Tracks," regularly gives information regarding services and programs available at the Career Development Center. Open houses are publicized periodically to encourage employees to visit the Center. Refreshments are provided to create a comfortable, relaxed atmosphere. Videotapes promoting the Center have been made by the Career Development Center staff and the past president of USWA Local 1299. These tapes were shown on the cable TV show, "Great Lakes Update".

Efforts to gain publicity had negative effects when a regional newspaper article regarding the creation of the Career Development Center was not viewed positively by union leaders. The implicit message received by union leaders was that "steelworkers were illiterate", and "management was responsible for the development of the Career Development Center". Though neither of the above impressions was anticipated, it would have been prudent to ask for the right to preview the newspaper article and restate any sensitively worded material that was open to misinterpretation. Though media coverage can be a positive force, it must be managed so it serves everyone's best interest. Other attempts to gain media coverage have included invitations to various congressmen and the First Lady, Barbara Bush. Unfortunately none of them was able to visit the Career Development Center.

None of the above methods of publicity has had the positive effect on recruitment that was anticipated. New methods of publicity are constantly being sought to increase the number of employees using the Center.

By far, the most successful publicity we have encountered is co-worker referral.

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Approximately 50% of new participants have come to the Career Development Center at the urging of a co-worker who has participated. Our best advertisements are satisfied participants who personally recommend our program to their co-workers.

Future plans include scheduling Career Development Center staff to speak at various employee meetings within the mill to give a short explanation about the Center and answer any questions. In addition, informational meetings for union representatives are encouraged. Efforts can be made to include a short message on employee paychecks or design an insert for pay envelopes promoting attendance at the Center.

Discussion

Incentives for attendance are a possibility for consideration. Some aspects of confidentiality do not remain intact when incentives are in place. Employees can choose to notify their employer upon completion of their program to receive a financial bonus or they can forgo the financial incentive and maintain their privacy.

Recording/Reporting

Formal registration for all students is part of the initial contact with the Career Development Center. Confidential registration at the Center is used to keep accurate records of participation/activity. For the GLS/USWA Career Development Center, information is requested from the student at the time of registration (Personal Information Sheet, See Figure 5). If an individual stops in on a one-time basis for a test aid or other handout, formal registration does not occur. The information is recorded and reported as drop-in participation.

Registration procedures that may also be helpful to the educational provider include assessment, an admissions application, and registration form. The registration information

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provided for both entities needs to be consistent for accurate record keeping.

An individual student file consists of the following:

- Personnel Information Sheet
- Assessment scores
- Daily work log
- Completed/current assignments

A monthly report is completed by the Lead Instructor to keep all parties (union, management, and educational provider) informed of the Center's progress. The information reported is detailed enough to track the trends of usage and help formulate plans for future recruitment efforts. The following is a list of topics covered in the GLS/USWA monthly report:

- Period covered (actual number of days open)
- Hours of operation
- Program offerings
- Yearly participation total
- Active participation for the month
- Shift distribution
- Job categories represented
- Progress to date

All but the last category are simple factual statements or numbers. "Progress to date" is a two page narrative of activities and events that have taken place during the month. Individual progress is reported without violating the principles of confidentiality.

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PERSONAL INFORMATION SHEET

Name _____

Street Address _____ City _____ State/Zip _____

Phone Number _____ Social Security Number _____

Date of Birth (Optional) _____ Initial Interview Date _____

Job Classification _____ Work Hours _____

Educational Background:

Last Grade Completed _____

College or Trade School _____

Other _____

What services are of interest to you?

_____

_____

How did you hear about the program?

_____

_____

==========

FOR INTERNAL USE ONLY--DO NOT WRITE BELOW THIS LINE

Recommendations:

_____

_____

_____

Figure 5

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Individual Participant Needs Assessment

Prospective participants are interviewed by instructors to establish goals as a basis for assessment. Every effort is put forth on the part of the staff to insure a positive initial contact for the prospective participant.

Goals and needs are discussed. Some participants are interested in short-term instruction to meet a specific skill level for a job-assigned class or test. These participants may ask for specific types of materials to help them reach personal goals. Others are more general or vague in describing their educational goals. Informal assessments in English/reading and math may be given if the individual's goals are for general improvement. In some situations, standardized testing may be used to measure skill levels. For those seeking entry into technical programs, a criterion-referenced assessment is administered to measure mastery of many specific skills in English/reading and math.

The Career Development Center uses a variety of methods to assess individual needs beginning with the initial interview. Instruments used for reading assessment at the Center vary widely. Tests of Adult Basic Education (TABE), the Reading Progress Scale (RPS), and the Nelson-Denny Reading Test are available for use. These standardized tests give grade level equivalents which are useful for determining material selection, but do not give a personal glimpse of the reader's strengths and weaknesses. Sections of the Qualitative Reading Inventory (Leslie & Caldwell, 1990) are used to get a grade level equivalent and a more detailed picture of the reader's strengths and weaknesses.

Learning Unlimited, (Learning Unlimited Systems) a criterion-referenced set of placement and diagnostic tests in math and reading is also used. This computer-managed set of tests

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coincides with a set of skill mastery lessons. A printout of an individual's mastery skills in English/reading and math is generated by the computer. These materials are not suitable for those with short-term goals since it takes approximately 90 minutes each to administer placement and diagnostic tests.

The Career Development Center math instructor designed an informal math assessment which provided insight as to where math instruction should begin. Several sections of the TABE provide grade level equivalents for math as well. Some math students come to the program with very specific math needs and goals so little or no assessment may be necessary.

Discussion

Care must be taken not to overwhelm a new participant with "testing" at the first meeting. Some individuals have difficulty or are unable to fill out a personal information sheet. The instructor must be sensitive to each situation and make reasonable decisions for assessment based on personal observation. Non-readers have developed many mechanisms for concealing their inability to read. Questions and statements like, "I don't have time to fill out these forms now, can I take them home?", or "I forgot my glasses" may signal a non-reader. Forms given to non-readers may place them in an uncomfortable situation. Very little formal assessment is done with non-readers once that situation becomes apparent. It is best to begin some pre-reading activity with which the student will meet with success to set a positive tone. It is very important to be aware of the wide range of reading ability of any given workforce.

Work Plans

Plans of work are formulated on the basis of participant goals and, if indicated, assessment results. Different learning styles and personal situations dictate individual plans.

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Some learners thrive in one-on-one situations with the instructor. Others prefer working through materials on their own and meeting with the instructor for discussion of questions and progress. In this Career Development Center, it is necessary to fit the plan of work to the individual's needs.

Discussion

Special needs surfaced regularly at CDC. There is no one set of materials or one plan of work that suits everyone. A program that is sensitive to needs, resourceful in accessing relevant materials, and flexible with scheduling has the highest chance of success. Many participants use the Career Development Center only once before a test to get a quick review of subject matter. Some pick up test-taking tips and will not be seen again if successful in accomplishing their goal. Some participants fall into the "learning disabled" category and care must be taken to ensure that each educational experience fits their particular style of learning. Other students who are enrolled in technical college courses may come for tutoring if they are having difficulty with English or math.

Drop-In Format

The drop-in format of the Career Development Center has been perceived differently by participants. On the positive side, some appreciated the stress free set-up and enjoyed the individual pacing of their lessons. On the negative side, some interpreted the lack of mandatory attendance as a lack of commitment on the part of the Center. The contention seems to be that if the Career Development Center is a worthwhile endeavor, it should be necessary to attend on a regular basis at scheduled times. Another concern that arises from the drop-in format is the need for privacy felt by some participants. There is no assurance that their time with the

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instructor will be private. When attendance totals are low, it is possible to plan for private sessions with participants. As attendance increases, it becomes necessary to provide small group instruction with new methods of meeting privacy needs.

Confidentiality

Confidentiality has been the cornerstone of the CDC union/management program. All participants are assured that no progress report or assessment results will be divulged. At the Career Development Center, personal records are not available to union or management officials. Several participants had expressed concern that information regarding skill levels could be used against them. It has been imperative to communicate clearly that individual records are confidential and seen only by Career Development Center staff and the participant.

Retention of Participants

Though goals will vary widely, certain patterns are likely to be repeated:

- Short-term goals
- Long-term goals
- Personal problems

Those with short-term goals who visit the Center have a specific objectives to meet, usually within a short time. Since job classification upgrades are improved by testing at GLS, many employees seek help with skills for specific tests. These include technical areas as well as math and reading. The Career Development Center has developed a set of Test Aids to facilitate those who are seeking this service. A number of two and three page handouts have been formulated on a variety of subjects:

- Test-taking Techniques

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- Test Anxiety
- Reading Test Questions
- Vocabulary/Analogies
- Series and Progressions
- Math

Typically, these employees have been appreciative of the "take with" approach and are advised to return if they have any questions about the information. They were asked to return after the test to make recommendations regarding the development of future test aids and evaluate those used. This feedback has been very valuable and is the basis for the expansion of these materials.

Those with long-term goals have usually in need of basic skills. These participants come with a goal of learning to read, write, or compute. Since these skills develop over a period of time, a schedule of weekly attendance is encouraged to review and develop new concepts. The Career Development Center has maintained long term contact with several participants who are progressing steadily through basic skills areas.

Occasionally a prospective participant has enrolled and asked for a specific skill. After the initial interview it became apparent that this person was in need of someone to listen as they work through a problem. Though Career Development Center staff cannot be expected to be therapists or counselors and were not expected to give advice, they were asked to be sympathetic listeners who can make informed suggestions for contacting appropriate parties or support services.

The Career Development Center has strived to be a vital and dynamic program that

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changes to accommodate the needs of those it serves. New programs and materials have been previewed regularly to update the learning opportunities available.

Participant motivation varies according to the individual. It is hoped that the safe, supporting atmosphere of the Center and the personal contacts with the staff have been enough to encourage the student to attend.

Discussion

A program that encourages personal growth encourages retention. Efforts must be focused on building strengths to improve weaknesses, not targeting weaknesses. The initial interview sets the tone for all future contacts. The prospective participants must leave the initial meeting with the feeling that they will be assisted in defining and/or meeting personal goals.

Monthly Staff/Instructor/Union/Company/Educational Provider Meetings

Although formal monthly meetings with staff and sponsors were not held, informal meetings between Center staff and GLS/USWA did occur on an as needed basis. Because the educational provider (WCCC) was on-site at the Center to provide instruction and administration of the program, informal meetings with GLS/USWA and Center staff were easily facilitated on short notice.

Discussion

For consistency in your program, plan formal meetings, if possible on a monthly basis. Topics to be considered are:

- Enrollment and participation status
- Ordering of supplies, software and books, etc.
- Recruitment and publicity

- The monthly report
- Budget status

Input from all team members strengthens working relationships among the partners and ensures a quality program.

Management of Daily Operations

The management of daily operations at the GLS/USWA Career Development Center was facilitated by the on-site WCCC Project Coordinator and Lead Instructor. The Project Coordinator was responsible for purchases of equipment, materials, and supplies, payment of instructors, and monitoring the budget. The Lead Instructor was responsible for instruction, the monthly report, and recommendations for purchases of instructional materials. Recruitment, participation, recording, and reporting were shared responsibilities for instructors, the Project Coordinator, and the Lead Instructor.

Discussion

The individual(s) responsible for management of daily operations depends on the set-up of a given program. Operations management is generally the function of the program director. The director also works with other program partners to resolve operational issues.

Monitor Expenditures

The monitoring and reporting of expenditures is essential for a balanced budget. Responsibility for monitoring and reporting expenses is dependent upon assigned program personnel. With the GLS/USWA Career Development Center, the WCCC Project Coordinator was directly responsible for monitoring expenditures, and GLS/USWA approved all purchases before ordering. When grant monies are involved, all expenditures were included in the initial

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proposal, and any variation had to be approved by the grantor.

Recommendations for supplies and materials were made by instructors and support staff who directly implement the program on a daily basis. The program director or Coordinator was responsible for ensuring sufficient funds and recording the transactions, although reporting procedures may have varied for individual contracts and grants. For individual contracts, reporting procedures were negotiated in the contract. With granted monies, reporting procedures were mandated and more extensive.

Discussion

In both situations, an expense report generated on a weekly or monthly basis is helpful. Whether the program is funded by a contract or grant, a budget set-up on a computer aided spreadsheet is also extremely beneficial. The computer will provide accuracy, quick access to expenditures and balances, and aid in the reporting process.

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ADMINISTRATION AND IMPLEMENTATION OF THE WORKPLACE LITERACY PROJECT

This section of the manual describes the GLS/USWA, WCCC, ITI partnership effort addressing the educational needs of GLS employees under the sponsorship of a USDOE Workplace Literacy Grant. Following is a description of what we did in the context of our various working environments to share a common mission in developing the potential of a particular segment of the GLS workforce. We describe our process for achieving a shared vision, the roles of the partnering organizations, the way we went about accomplishing our objectives, the instructional materials produced, our system of delivery, the results we observed, and the next steps we hope to take. Our purpose is simple -- to use this project as a case study to illustrate how our colleagues can build upon this for future efforts.

What is Workplace Literacy?

The definition of workplace literacy is likely to vary from organization to organization and from project to project. So, the first step was to define it within the context of this project. Our general objectives were the following:

a) design and develop a workplace job related literacy curriculum based on the needs of the hourly workers. The content of any course would be based on an analysis of reading and math skills required on the job and use examples from the workplace.

b) deliver the educational program using this curriculum to these workers through individualized programs that would meet workers educational needs and time and locational constraints.

c) encourage worker participation, overcoming any identified deterrents through additional project activities such as publicity, support groups, and incentives.

d) determine the level of workers' participated through individual attendance and reactions, testing of learning, and their participation in other educational and training programs.

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Our specific goal was to upgrade the skills of GLS employees to enable them to enter and successfully complete the Electrical Power Technology associate degree program at WCCC. Our efforts were to be linked not only to the Electrical Power Technology program, but also to the existing GLS/USWA Career Development Center. This project entitled "Tech Prep"[5] would provide the link between general basic skills instruction offered at the Career Development Center and the technical training provided in the Electrical Power Technology curriculum.

These goals and objectives were used to focus our initial discussions. Yet, our working definition of workplace literacy was not achieved until many other issues in the formation of the partnership and understanding of workers needs were established. We now turn to those precursor, but all important issues.

Establishing the Partnership

Our initial work focused in two directions, developing a strategic vision and confirming evidence that supported the initial needs for the project. The first was established during the early months of the project, meeting monthly with the Steering Committee; the second was implemented by both data collection and subsequent discussion with the Steering Committee. Thus, the establishment and maintenance of the Steering Committee was an important ingredient for getting project work going in the right (i.e., a consensus) direction.

The Steering Committee was formulated from the key personnel who had a part in writing the proposal to the U.S. Dept. of Education, as well as staff to the project and others who could be directly impacted by the project. The Steering Committee was to have decision-making

[5] The terms Tech Prep and Math for Success in Electronics are used interchangeably throughout this document.

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authority, and not function only in an advisory capacity. The following types of personnel were regular members:

GLS: Supervisor of Employee Training and Development

USWA: Training Coordinator

WCCC: Project Coordinator
Asst. Project Coordinator
Supervisor of Corporate Training
Electronics Instructor
Director of Electronics
Math and Electronics Tutors
Career Development Center Lead Instructor

ITI: Project Director
Instructional Designer
Data Collection Specialist
Project Coordinator
Database Developer
Director of Evaluation
Electronics Engineer

Most of the individuals designated above attended the monthly meetings for the project. An occasional guest was the Dean of WCCC, Downriver campus where the WCCC personnel were employed. The meetings were organized around a standard agenda and lasted from one and one-half to three hours. All major issues were discussed and resolved in this forum throughout the project. Issues involving individuals or of indirect impact were handled outside this setting. All meetings took place in the Great Lakes Training Center in Ecorse, Michigan.

Strategic Vision and the Roles of the Partners

The first major tasks of the Steering Committee was to create a vision for the project and define the working relationships among the partner organizations. While each organization

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agreed upon the Scope of Work as submitted to the sponsor, there was a great deal of work to be accomplished in defining the specifics of the tasks and roles.

We began with the general description of the roles defined for each of the partners that was abstracted from the original proposal. A second step was to agree upon some basic assumptions underlying the general work. Some of this information is displayed in Figure 6. This figure acknowledges that there exist "disconnects" between what exists in the electronics curriculum and actual job tasks. Part of the goal for this project was to close some of those disconnects. Secondly, Figure 6 Job/Curriculum Articulation literacy requirements needed to come from aspects of job performance and means had to be developed to facilitate this linkage.

Job / Curriculum Articulation
Great Lakes Steel/USWA--Wayne County CC--ITI

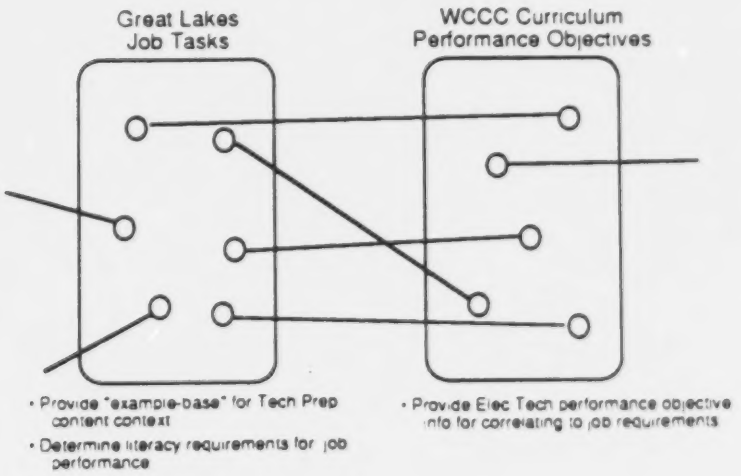
Great Lakes
Job Tasks
WCCC Curriculum
Performance Objectives
• Provide "example-base" for Tech Prep content context
• Determine literacy requirements for job performance
• Provide Elec Tech performance objective info for correlating to job requirements

Figure 6.

Our next step was to display pictorially our definition of what workplace literacy was for this project. A diagram showing our resolution is given as Figure 7. Here "Tech Prep" is

indicated as the bridge between basic adult literacy and the community college curriculum as well as having an indirect impact on standard technical training. At this point in the project, we had not yet agreed to the specific content of the "Tech Prep" instruction. Because of its critical location in "developing" skills, the program we were to develop had to attain seamless interfaces with the existing components.

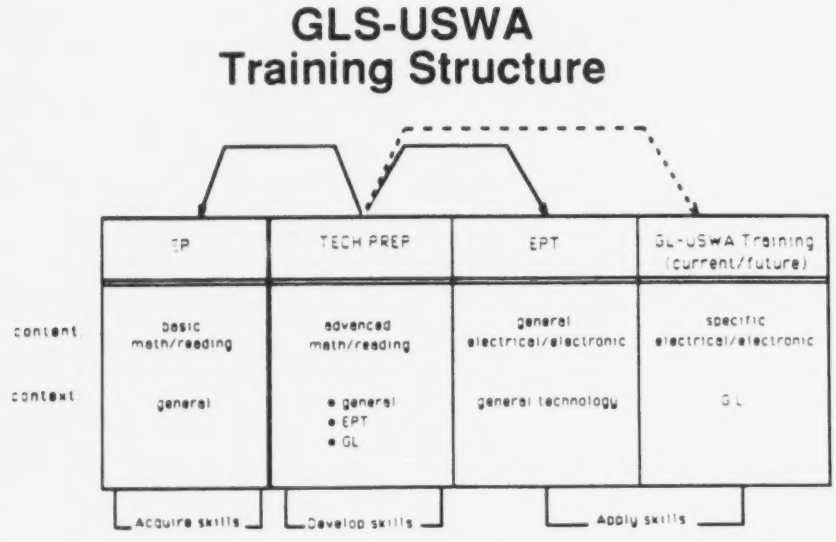

Figure 7.

To achieve this interface, we had to position "Tech Prep" to perform in a consensus role for the Steering Committee. At this point the definition of what each organization's contributions were to be was made clear. A diagram showing this "positioning" is shown as Figure 8. One purpose of this was to depict in process flow terms how a candidate student would move through the system. In this way, we were able to determine the weak points of the existing system or areas where we determined that assistance was needed. It was also determined that "Tech Prep" instruction was to function in two ways--as a precursor to entering the Electrical Power

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Technology Program and as supplemental assistance during the program. This resolution meant, for example, that tutoring needed to occur in two different locations with two sets of tutors. Also, the requirements for monitoring the progress of students attained new importance.

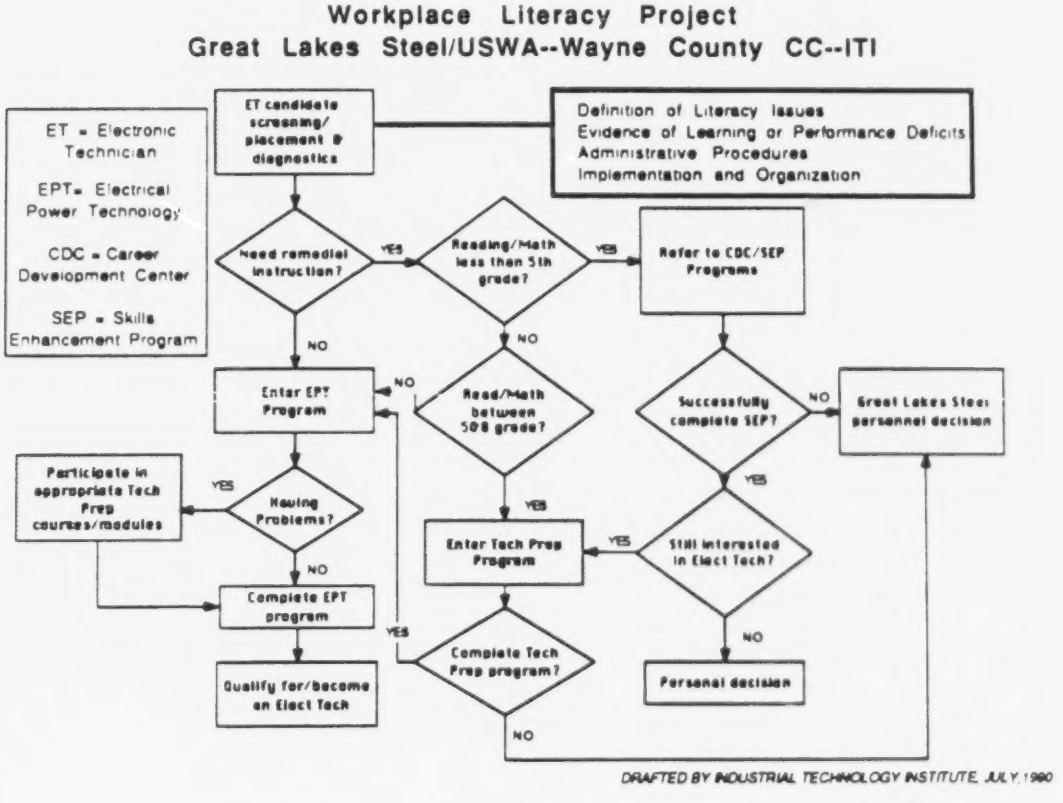

Figure 8.

The purpose of the above diagrams was to obtain understanding and consensus as to what we were about, and secondly to define the roles for the partner organizations. Because this consensus was developed early in the process, our major efforts could be devoted to executing the particular tasks required by each organization's role.

Systematic Components of the Project

Our general process components can be divided into six steps:

- Create partner consensus on project definition and goals
- Refine/redefine problem
- Negotiate intervention strategies
- Develop intervention
- Implement intervention
- Evaluate project

Except for the first two steps, the process was both iterative and concurrent. The first two steps--creating a vision, refining the problem was achieved as described above. Other steps required modification as deliverables were agreed upon, materials were tested, and the delivery process was implemented. Thus, elements of the steps had to be modified as conditions warranted. For example, we saw the necessity to develop a database for skill linkages after about six months into the project--this was not called for initially. Also, at one point we found it necessary to speed up the material development process which meant that other conditions had to be changed. Overall, we found it to be both a flexible process, yet structured sufficiently to attain our desired outcomes. For the detailed work breakdown structure followed by ITI staff, see the task outline supplied in Appendix B.

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SPECIALIZED MATERIALS/WORKBOOKS

Select Development Team

Project managers and administrators appointed a Materials Development Team for this project. The team consisted of one subject matter expert (a WCCC electronics instructor), one instructional designer, one task analyst, and support staff (ITI staff).

Define Problem

Within the WCCC Electrical Power Technology program, GLS students experienced difficulty in specific courses (e.g., Math for Electronics) which were offered primarily in the first year and a half of the three year program. Additional learning resources were needed to better prepare students for success in the WCCC Electrical Power Technology program. These resources served as educational links between existing support programs/materials available to students through the GLS/USWA Career Development Center and the WCCC Electrical Power Technology training.

Collect and Analyze Data

The development team examined numerous materials, programs, and processes at WCCC and GLS associated with the targeted Electrical Power Technology courses. Analysis efforts focused on:

- Reviewing Electrical Power Technology course outlines and syllabi for behavioral objectives and expectations;
- Reviewing Electrical Power Technology course texts, exams, quizzes, homework tasks, handouts for content, format, expectations, and reading level;
- Collecting feedback from past and present Electrical Power Technology GLS students through a survey and focus group; focus group discussion centered on areas of academic difficulty, types of academic and administrative support (or lack thereof), suggestions for

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new students entering the Electrical Power Technology program, and format and content suggestions for support materials;

• Interviewing Electrical Power Technology course instructor(s) and WCCC lab tutors to identify the academic topics for which students pursued tutoring support, and the kinds of support materials most effective and popular with students requesting assistance;

• Reviewing ASSET test scores of GLS students entering the Electrical Power Technology program.

Some course texts were rated at higher reading levels than generally expected (expected reading level 13, rated reading levels 14-17); however, ASSET test scores and comments from instructors and GLS students did not suggest a significant deficiency in reading skills among GLS students. Data did suggest that GLS students were entering the program without prerequisite math competencies; in turn, students experienced difficulty with course content. Data results suggested that students required support in developing or reviewing the following math competencies:

- Adding, subtracting, multiplying, and dividing signed numbers
- Adding, subtracting, multiplying, and dividing fractions
- Adding, subtracting, multiplying, and dividing decimal numbers
- Adding, subtracting, multiplying, and dividing powers of ten
- Adding, subtracting, multiplying, and dividing numbers written in scientific notation
- Defining independent and dependent variables when working with coordinates
- Plotting and drawing line graphs
- Extrapolating information from line graphs
- Converting metric measurements
- Converting English and metric measurements

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- Converting English measurements
- Cross multiplying when working with proportions
- Converting fractions and decimal numbers
- Converting fractions and percents
- Converting decimal numbers and percents
- Calculating percents
- Rounding numbers
- Solving word problems
- Solving equauons with fractions
- Solving equations with whole numbers
- Solving equations with decimal numbers
- Solving equations with signed numbers
- Solving equations with squares and square roots
- Solving equations with scientific notation
- Solving non-linear equations with whole numbers
- Solving linear equations by transposing
- Solving non-linear equations by transposing

Development of Materials

In setting objectives, consideration was given to:

- How frequently the math competency was used in the targeted Electrical Power Technology courses
- The degree to which students experienced difficulty in learning/applying the math

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competency

Prototype criteria included:

- Ease of use
- Cost efficiency for reproduction
- Meeting the individual learning needs of the student
- Offer opportunity to practice skill(s)
- Ability to link (cross-reference) materials with existing support materials and Electrical Power Technology course curriculum

A series of workbooks focusing on specific math competencies was developed. Features of each workbook include:

- Self-administered format; suitable for individual, dyad or small group use
- Math content taught in the context of select Electrical Power Technology courses
- Emphasis on math and electrical/electronic vocabularies
- Skill prerequisites
- An introductory statement focusing the student on the content of the workbook
- Job examples of when the math competency is used in an electrical/electronic technician job
- A Key Term section highlighting math terms used in the workbook with corresponding definitions and examples
- Definitions of electrical/electronic terms used in math word problems
- Methodologies and examples
- Practice problems and answers

A total of 27 workbooks was drafted addressing electrical/electronic math competencies.

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In addition, three reference books were developed to assist students with the workbooks. These reference books are a(n):

- Math term glossary
- Electrical/electronic term glossary
- Solving word problems

An Instructors Guide was also developed to enhance the use of the materials.

As workbooks were developed, they were reviewed by GLS Electrical Power Technology students, project administrators, clients, and WCCC instructors and tutors. Workbooks were revised according to feedback. The subject matter expert had final decision over any discrepancies in feedback. This is process is illustrated in Figure 9.

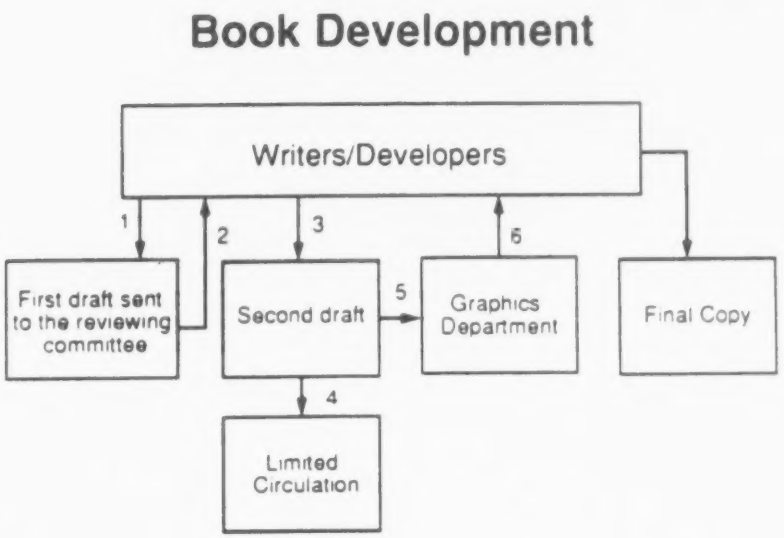

Figure 9.

Distribution and Uses of Materials

The materials are available to instructors and students at the GLS/USWA Career Development Center and WCCC Multi Learning Labs (tutoring services) at the WCCC Downriver Campus.

Discussion

Material use varies according to need. Informal tutoring can be facilitated at the Career Development Center when students need to improve their math skills to pass a test for job upgrading, preparation for college courses, or general knowledge. Formal tutoring occurs at the Multi Learning Labs for students preparing for, or currently enrolled in electronic courses.

Seminars can be arranged for students entering an electrical/electronic program. The seminar should be taken before beginning courses to promote success. WCCC faculty and administration developed a seminar using the twenty seven "Math for Success in Electronics" workbooks. The seminar consisted of four, five hour sessions. Eight workbooks were covered for the first three weeks of the seminar. The fourth week, the final three workbooks were covered, and the remainder of the session included review, posttesting, and student evaluation of the course.

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EVALUATION

GLS Electrical Power Technology Student Program Evaluation

Program evaluation first began with identifying the difficulties the students were experiencing through a needs assessment. Using this process, a specific population of GLS employees with particular needs was identified. It was discovered that the employees enrolled in the WCCC Electrical Power Technology program often experienced math related difficulties. Though general math instruction and support was available through the Career Development Center, what was needed was a math literacy program specifically developed to complement technical training. GLS/USWA, WCCC and ITI joined as partners to address the educational needs of this target population under the sponsorship of a USDOE Workplace Literacy Grant.

First, the difficulties the employees were experiencing had to be explicitly identified through a needs assessment effort. Electrical Power Technology students were sent questionnaires which asked them to note their problems and concerns (See Appendix C1). In addition, respondents were invited to attend a focus group discussion to further identify issues (See Appendix C2). At the same time, instructors and tutors were interviewed and students' ASSET test math and reading scores were examined. Also, background information on electrical/electronic related jobs at GLS was collected from GLS/USWA union and management representatives. Through this effort, the project team was able to distinguish those math related problems from other factors which may impact student performance.

The needs assessment did in fact reveal several issues not specifically related to math competency. These concerns were fed back to the project team and the program administrators. Though they were generated by a specific subgroup of GLS employees and WCCC students,

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many concerns were relevant to the whole GLS student population. Issues such as the registration process, tuition reimbursement procedures, supervisor attitudes toward employees attending school, increased personal and family sacrifice, and general support mechanisms were all uncovered.

Based upon student concerns, the program design and administration were slightly modified. Tutoring hours were adjusted to better accommodate employee time schedules. Tuition reimbursement is now administered differently to decrease financial inconveniences of employees. More consistent admissions procedures were established to ensure all students receive proper assessment and counselling before program entry.

Evaluation Within Material Development

The delivery system used to address math related problems took the form of a series of workbooks, "Math for Success in Electronics" which served as the link between support materials available at the Career Development Center and Electrical Power Technology coursework. The development of this educational intervention included a mechanism for evaluation, feedback and revision. Evaluation of both content and usage was undertaken.

Phase I of the evaluation process requested students, tutors, instructors and union/management to input on content and format. Survey instruments were developed and first drafts of the workbooks were distributed to them for review. The responses were returned to the development team and incorporated into the revision process (See Appendix C3).

Phase II of the evaluation process focused on material usage. The revised workbooks were distributed through tutors and instructors for pilot testing. Tutors used the workbooks as primary resource materials for students with math related problems. At the resolution of a

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particular skill set, tutors completed a form indicating which workbook(s) used, which problem it addressed, how it was used, and the tutor's assessment of its usefulness for the student (See Appendix C4).

Pilot workbooks were also distributed to students in an Electrical Power Technology class by the instructor. During the last week of class, students participated in a structured group discussion. The discussion included their overall response to the workbooks, the ease of independent usage, how they used the workbooks, relevancy to coursework, and so forth. Again, these responses were reviewed by the materials development team and contributed to final revisions and implementation guidelines.

In Phase III of the evaluation, the final version of the "Math for Success in Electronics" workbooks were used as the text for a math seminar. Attendees were first year Electrical Power Technology students (Fall semester, 1991). The seminar instructor (also an Electrical Power Technology instructor) used sample problems from a variety of the workbooks to compose a pretest for seminar participants. Additional sample problems from the workbooks served as a posttest at the conclusion of the seminar.

The student evaluation consisted of ten short questions scaled from one to ten (See Appendix C5). Each student was asked to fill out a confidential evaluation. Final evaluation of the course was derived from a comparison of pretest and posttest scores. WCCC Electrical Power Technology students completed the seminar in "Math for Success in Electronics" with an average score of 81%. In comparison to the initial 45% average score, the course increased math skill competencies an average of 36% per participant (14 total).

Within the instructional design methodology, mechanisms for input from students, tutors,

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instructors, and the project team had been put in place. This approach allowed for the evaluation of content, format, and variety of material use, in addition to technical accuracy and applicability.

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APPENDIX A

Historical Overview of Training Electrical Craft Personnel

The Great Lakes Division is located on the Detroit River just south of the city of Detroit. The mill was born as Great Lakes Steel (GLS) in the summer of 1929 to serve the burgeoning automotive market. Soon afterward, in November of 1929, GLS merged with Weirton Steel and the M.A. Hanna Company to form National Steel Corporation. Today, the Great Lakes Division is an integrated steel plant with an annual capacity of 3.5 million tons and a population of 4,700 people.

In the 1930s and 1940s as GLS grew, training of electrical maintenance personnel took place on an OJT basis. GLS maintenance personnel learned from equipment builders and company engineers how to maintain the electrical equipment. They in turn trained succeeding generations in a similar fashion.

During the plant's evolutionary period, GLS management in cooperation with USWA Local 1299, agreed to develop electrical craft personnel within the structure of the GLS organization. Electrical craft personnel would normally not be hired from the outside. Employees coming into the Great Lakes bargaining unit would be hired with no significant educational level and enter as laborers. To move to the electrical craft, the employee would bid electrical helper as his seniority allowed.

Once in the craft, the electrical helper worked with experienced electricians and learned by means of an informal OJT process. Progression through the electrical craft was based on how a craftperson responded to questions posed by a supervisor. As might be suspected, this method of training and progression was inconsistent, capricious, and ineffective. But it worked for a long

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while because there were many people in the electrical craft, crew sizes were large, and foremen were plentiful. There was always someone around who knew what to do.

In the early 1960s, progression through the electrical craft was taken out of the hands of the supervisors. The craftperson was now required to take a paper-pencil test administered by a GLS testing function. But, this was not the answer to a trained, capable workforce. In the mid 1970s, the need for electrical training became more apparent. GLS contracted with Henry Ford Community College to deliver a basic electricity course at the GLS site. But, this effort was lacking since a laboratory facility was unavailable, and the instructor had no mill experience and had difficulty in relating to practical applications in the plant.

In 1979, the GLS Training Department was established. Over time, steel mill electrical courses were developed and hourly instructors with mill experience taught the courses. These courses were offered to electrical craft personnel - motor inspectors, wiremen, and electronic repairmen - who volunteered to attend on company time.

In the early 1980s, the economy negatively impacted GLS just as every other integrated steel plant in the country. Downsizing and increased productivity became the rule. The number of electrical foremen was reduced, sizes of crews were cut back, and the electrical helper position was eliminated in most cases. With a reduced crew size and less foremen, this meant fewer people were available to troubleshoot systems. This forced more responsibility on the individual craftperson. And, with the helper position eliminated, there was no entry level position into the electrical craft which denoted a "trainee" or inexperienced person. Those now entering the craft passed a paper-pencil test in the Testing Department and were granted a "Starting" electrical rate without any practical experience.

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To summarize, then, as GLS moved into the mid 1980s, this was the situation with electrical craft personnel: The company agrees to supply the electrical craft from the bargaining unit workforce. Under normal circumstances, the company will not go outside to hire electrical craft personnel; Training is made available for those in the electrical craft; No minimum educational level is required of new bargaining unit employees. There is no general indication of whether the employee can successfully complete electrical training; The "Helper" or training position for the electrical craft is eliminated; To progress through the craft, paper-pencil tests are passed; Crew sizes are reduced resulting in more responsibility to perform for the individual electrical craftperson.

Up through the mid 1980s, the system of testing, training, and progression through the craft appeared to be working. But, in 1985 with the start of the electrogalvanizing line (EGL), technology changed abruptly for GLS and the inadequacies of the system were apparent.

The EGL was GLS's first major encounter with programmable logic controllers (PLC's). No more hard-wired control circuits. This was a technology leap for the electrical craft.

EGL electrical personnel who serviced the plant were intelligent, experienced people who worked closely with suppliers and engineers to learn the equipment. They attended vendor schools and helped install the equipment whenever possible. But, for some time after the start of the facility, the electrical systems were basically serviced by equipment engineers of the suppliers. Great Lakes electrical personnel did not have the prerequisite skills for the training required. This either made the training a very long effort or a waste of time.

In 1986, a Basic Labor Agreement was signed which authorized the combination of many crafts. For the electrical area, this meant that motor inspectors and wiremen were now

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electricians. And, electronic repairmen and instrument repairmen were combined into electronic technicians. From a training perspective, the electronic technician craft combination generated a major concern because the instrument repairman classification had not worked with electricity.

This craft basically dealt with the physics of water columns, air pressure, and valve diagrams. Now, this craftperson would be required to service PLC's.

In 1987, training was delivered for a new ladle metallurgy facility (LMF) and continuous caster. Once again, the electronic technicians involved in the project were bright, but didn't have the prerequisite skills to fully absorb the training. The learning curve was long. Equipment suppliers and control engineers were the major resources for the maintenance and troubleshooting of the electrical systems for these new facilities.

With experiences of the EGL, craft combinations, LMF, and continuous caster, it was apparent that the electrical craft, and especially the electronic technician position, required technical improvement. Toward this end, one of the first actions taken was to require that all new hourly employees have a high school diploma or G.E.D. and pass an examination which measured math and reading ability. This began in May, 1987.

In 1988, GLS realized that it did not have the resources to educated a fully capable electronic technician and decided to encourage incumbent electrical personnel, and those interested in entering the electrical craft, to attend school on their own time. A list of electrical courses was developed for two local community colleges. These courses basically lead to an associates degree in the electrical/electronic field. A newsletter was published with the notice of the new program and indicated that employees would be reimbursed for tuition, fees, and books. In addition, an incentive bonus of $150/credit hour would be paid for up to two courses

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if a grade of "C" or better was received.

In the fall of 1988, the first semester the program was offered, hardly anyone signed up. This was puzzling. After some investigation, it was determined that employees who wanted to participate worked swing shift and would regularly be missing class. There was no way these employees would risk going to school under those conditions.

By January of 1989, a partnership was formed with the Downriver Campus of Wayne County Community College whereby identical courses were offered mornings and evenings that employees could attend as their schedules allowed. The result was a Swing Shift Electronics Program which attracted 25-30 employees for three consecutive years.

The Swing Shift Electronics Program is a significant tool for GLS to improve the technical capabilities of its electrical craft personnel and it is also a means for employees to improve themselves. But, many cannot take advantage of the program because of weak skills in reading and math.

In November 1989, GLS and the USWA jointly began operation of a Career Development Center with the intent of improving workplace literacy skills of the bargaining unit population. Many personnel who were enrolled in the Swing Shift Program or who wished to improve their skills before entering the program, took advantage of the Career Development Center training. But, specific instructional materials that related directly to the Swing Shift Program were needed. This was the beginning of the Workplace Literacy Project.

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GREAT LAKES STEEL CHRONOLOGY CHART

1929	National Steel forms through merger of Great Lakes Steel, Weirton Steel, and M.A. Hanna Co.
1959	Written test for screening prospective employees in math and reading
1980	Recession -- earnings drop by 30% and employment declines by over 4,000
1984	N.K.K. Corporation, the second largest steelmaker in Japan, purchases 50% of National Steel
1986	Contract calls for craft combination from 78 to 16 Mandatory craft combination training begins Cooperative partnership forms
1987	Self Improvement Plan for employees
6/1989	Formation of Career Development Institute
10/1989	GLS/USWA, WCCC, ITI apply for Workplace Literacy grant
11/1989	Career Development Center becomes operational
1990	N.K.K. Corporation acquires additional 20% of interest

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APPENDIX B

Work Breakdown Task List Used by ITI Staff

I. Project Planning
- A. Identify and document current procedures/processes
  - 1. identify step procedures for GLS employees to enroll in EPT program
    - a. where students register
    - b. when/how any assessments are done
    - c. what assessment tools used - obtain a copy
    - d. what counselling received
    - e. what tracking procedures employed
  - 2. Take above information create flow chart
  - 3. Obtain listing of all instructors teaching EPT course
- B. Develop implementation guidelines for WC3 TechPrep administration
- C. Identify range for TechPrep materials
  - 1. Clarify courses in EPT program
  - 2. Identify EPT courses to be included in TechPrep

II. Instructional Needs and Task Analysis
- A. Obtain all materials used in the identified 8 courses and standards courses
  - 1. Electronics Department Chair (WCCC)
  - 2. Lead Electronics Instructor (WCCC)
  - 3. TechPrep Administrator (WCCC-CDC)
- B. Analyze information from appropriate sources as to areas of student difficulty in each of 8 courses
  - 1. Lead Electronics Instructor
  - 2. Electronics Department Chair
  - 3. CDC Mathematics tutor
  - 4. Asset test profiles
  - 5. students
    - a. CDC survey
    - b. Group 1 focus group
    - c. Group 2 focus group
- C. Perform readability test on EPT and standards course texts
- D. Develop curriculum content outlines for the 8 courses
  - 1. 85% based on text
  - 2. 15 % based on additional information from Lead Electronics Instructor
- E. Develop curriculum content outlines for standards courses
- F. Review literature and identify general trends in future job needs/skills
  - 1. Programmable Logic Controller (PLC) technology

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2. other technology?
3. Great Lakes PLC Subject matter Expert (SME)
4. ITI PLC SME

G. Collect and organize information from GLS Background Info sheet
H. Obtain materials from electronic courses offered through GLS training center
I. Arrange focus group with GLS-USWA personnel to discuss current and future job needs
J. Combine and review data collected with project members
K. Identify and verify content and context of TechPrep
L. Identify criteria for examining jobs tasks, education and basic skill needs
1.Collect/review job task, training, basic skills, curriculum materials
a. V-Techs
b. NW Iowa Technical College
c. USWA
d. CORD/Transformations
e. TPC program
f. ACTT
g. JSEP
h. NICET
2. Develop basic skills data base
a. identify resource materials
1. NICET
2. JSEP
3. Michigan Trade & Industrial Curriculum Guide
b. design data
1. determine type of data
2. determine relational paths
c. design II
1. determine screen formats
2. determine report formats
d. program I
1. alpha version of software
2. review for bugs, changes
e. program II
1. determine final report & screen format
2. work out ambiguities in software
f. program III
1. incorporate changes into graphical interface
2. deliver beta product
g. data entry I - enter data into beta product
h. document I - develop user manual for beta product
i. program IV
1. correcting bugs form beta version

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2. final release version

j. document II

1. editing of document I
2. final version of user manual

k. data prep - compile info for data entry

l. data entry II - enter data into final version

III. TechPrep Design and Development

A. Develop draft document(s)

1. Work with appropriate SMEs as necessary
   a. basic skills: Mathematics and English tutors WCCC CDC
   b. course content and curriculum related skills: Lead Electronics Instructor, exemplary students
   c. Great Lakes environment context (current and future): ITI PLC SME, GL PLC SME
2. Discuss /plan formatting with graphics specialist
3. Establish prerequisites for workbooks

B. Set milestones for product development

1. Complete six workbooks by 11/20/90 for student testing
2. Complete 6 or more additional workbooks by 2/15/91

C. Identify document reviewers and role in review process

1. Establish non-student reviewers
2. Define feedback needed from non-student reviewers (technical content accuracy)
3. Work with evaluators in coordinating books for student reviewers
4. Define feedback needed from students reviewers

D. First draft review

E. Revise document(s)

F. Second draft review

G. Revise document(s)

H. Develop "flash cards" to support each workbook

I. Pilot TechPrep (materials and delivery)

1. set up pilot run
2. run pilot
3. evaluate
4. revise as necessary
5. make recommendations to WC3 on TechPrep administration process

J. Final Review

K. Develop matrix (ongoing) linking Tech Prep workbooks to Learning Unlimited materials

L. Production

M. Develop matrix linking Tech Prep workbooks to EPT courses

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IV. Evaluation

A. Evaluate prototype workbooks

B. Determine opportunities for evaluating preparatory use of workbooks

C. Determine opportunities for evaluating in-class use of workbooks

D. Carry out evaluations of above

S.1

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APPENDIX C

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APPENDIX C

DOCUMENT 1

EPT STUDENT QUESTIONNAIRE

INSTRUCTIONS: Please check all boxes that apply to you.

PART I : COUNSELING AND RECOMMENDATIONS

1. Did you take the ASSET test?

☐ yes ☐ no

2. Did you enroll in any classes recommended as a result of your ASSET scores?

☐ yes ☐ no ☐ none recommended

3. Have you met with a Wayne County Community College counselor?

☐ once ☐ occasionally ☐ regularly ☐ never

4. Have you met with a Math Tutor or visited the Math Lab?

☐ once ☐ occasionally ☐ regularly ☐ never

5. Have you met with an English Tutor or visited the English Lab?

☐ once ☐ occasionally ☐ regularly ☐ never

PART II: EPT COURSES

What areas of difficulties have you experienced (if any) with the following EPT courses?

6. **EE101 DC Fundamentals**

- ☐ reading /understanding text
- ☐ doing practice assignments
- ☐ understanding lectures
- ☐ other (please specify)

_____

- ☐ no difficulties
- ☐ did not take class

7. **EE103 DC Laboratory**

- ☐ reading /understanding text
- ☐ doing practice assignments
- ☐ understanding lectures
- ☐ other (please specify)

_____

- ☐ no difficulties
- ☐ did not take class

8. **EE107 Mathematics for E/EI 3**

- ☐ reading /understanding text
- ☐ doing practice assignments
- ☐ understanding lectures
- ☐ other (please specify)

_____

- ☐ no difficulties
- ☐ did not take class

9. **EE102 AC Fundamentals**

- ☐ reading /understanding text
- ☐ doing practice assignments
- ☐ understanding lectures
- ☐ other (please specify)

_____

- ☐ no difficulties
- ☐ did not take class

10. **EE113 AC Laboratory**

- ☐ reading /understanding text
- ☐ doing practice assignments
- ☐ understanding lectures
- ☐ other (please specify)

_____

- ☐ no difficulties
- ☐ did not take class

11. **EE115 Mathematics for E/E II**

- ☐ reading /understanding text
- ☐ doing practice assignments
- ☐ understanding lectures
- ☐ other (please specify)

_____

- ☐ no difficulties
- ☐ did not take class

12. **PHY230 General Physics - Lecture**

- ☐ reading /understanding text
- ☐ doing practice assignments
- ☐ understanding lectures
- ☐ other (please specify)

_____

- ☐ no difficulties
- ☐ did not take class

13. **PHY231 General Physics - Laboratory**

- ☐ reading /understanding text
- ☐ doing practice assignments
- ☐ understanding lectures
- ☐ other (please specify)

_____

- ☐ no difficulties
- ☐ did not take class

14. **PHY235 General Physics**

- ☐ reading /understanding text
- ☐ doing practice assignments
- ☐ understanding lectures
- ☐ other (please specify)

_____

- ☐ no difficulties
- ☐ did not take class

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15. **ENG101 Reading Skills Development**

- ☐ reading /understanding text
- ☐ doing practice assignments
- ☐ understanding lectures
- ☐ other (please specify)

_____

- ☐ no difficulties
- ☐ did not take class

16. **ENG110 English I**

- ☐ reading /understanding text
- ☐ doing practice assignments
- ☐ understanding lectures
- ☐ other (please specify)

_____

- ☐ no difficulties
- ☐ did not take class

17. **ENG 134 Technical Communications**

- ☐ reading /understanding text
- ☐ doing practice assignments
- ☐ understanding lectures
- ☐ other (please specify)

_____

- ☐ no difficulties
- ☐ did not take class

THANK YOU FOR YOUR TIME AND COOPERATION
REMEMBER TO SEND IN YOUR POST CARD TO PARTICIPATE IN THE GROUP DISCUSSION

APPENDIX C

DOCUMENT 2

STUDENT FOCUS GROUP STRATEGY

EPT STUDENT FOCUS GROUP STRATEGY

Participants:

Group 1 students, Group 2 students

Purpose:

To identify the needs and concerns of EPT students, as part of an overall strategy to develop ElecTech materials

General Discussion Flow:

I. Warm-up and General Impressions:
   - A. student's feelings about overall program
   - B. identifying any issues or topics we have not foreseen

II. Preparation
   - A. identifying any front end preparation/information the students feel would have been useful
   - B. categorizing the above
     1. specific academic skills
     2. general study skills
     3. other

III. Program Participation
   - A. identifying ongoing challenges with program participation
   - B. stratify by
     1. those impacted by front-end preparation
     2. others

IV. Support
   - A. how students have handled challenges
   - B. why students have used particular resources

V. Summary - review, categorize information

APPENDIX C

DOCUMENT 3

WORKBOOK EVALUATION FORM

Booklet # _____
Form # _____

INSTRUCTIONS:

Thank you for helping us evaluate materials we are developing for the Tech Prep Workbook Series. Following is a list of questions about the workbooks. As you will see, our questions are organized into four categories: timing, content, format, and general impressions.

Most of the questions begin with a four point rating scale, and then ask for details when problems are detected. The scale is:

1 = There are serious problems which must be fixed.
2 = There are some problems which should be fixed.
3 = The material is fine.
4 = The material does a really good job.

After the scale, you will be asked to write some of your opinions about those items which need improvement. At these times, feel free to write as much or as little as you think is necessary. If we feel that you have detected some particularly important issue, we may ask to interview you briefly at a later time.

We suggest that you begin by familiarizing yourself with this questionnaire, then work through the workbook, and then answer our evaluation questions. While using the workbook, please act as if you were a person using these materials as preparation for entering the EPT program.

Your participation in this evaluation effort is strictly confidential.

PART I: TIMING

1. About how long did it take to complete the workbook? _____

2. How did you go about completing the workbook?

(please mark the appropriate response)

_____ went through the entire workbook in one sitting
_____ went through some of the workbook, then finished the rest later

PART II: CONTENT

1. Is the information presented in a clear and easy to understand manner?

(Please circle the appropriate response.)

1 = There are serious problems which must be fixed.
2 = There are some problems which should be fixed.
3 = The material is fine.
4 = The material does a really good job.

If you answered "1" or a "2", please tell us:

a. What parts are confusing?

b. Why was each of those parts confusing?

2. Is the language (words, length of sentences, etc.) easily understood?

1 = There are serious problems which must be fixed.
2 = There are some problems which should be fixed.
3 = The material is fine.
4 = The material does a really good job.

If you answered "1" or a "2" , please tell us:

a. What parts are confusing?

b. Why was each of those parts confusing?

3. Is the "Key Word" section of the workbook helpful?

1 = There are serious problems which must be fixed.
2 = There are some problems which should be fixed.
3 = The material is fine.
4 = The material does a really good job.

If you answered "1" or a "2" , please tell us:

a. Why did you not like the "Key Word " section?

b. How can it be improved?

4. Does the workbook contain enough information to understand and work through the problems?

1 = There are serious problems which must be fixed.
2 = There are some problems which should be fixed.
3 = The material is fine.
4 = The material does a really good job.

If you answered "1" or a "2", please tell us:

a. Which problems did not have enough supporting material?

b. What extra information should have been included?

5. Are the answers to the workbook problems easily understood?

1 = There are serious problems which must be fixed.
2 = There are some problems which should be fixed.
3 = The material is fine.
4 = The material does a really good job.

If you answered "1" or a "2", please tell us:

a. Which answers were problematic?

b. What extra information should have been included?

6. Is there anything about the content of the workbook that you have not told us that we should know about?

PART III: FORMAT

7. Is the information organized in a manner that is easy to use and follow?

1 = There are serious problems which must be fixed.
2 = There are some problems which should be fixed.
3 = The material is fine.
4 = The material does a really good job.

If you answered "1" or a "2", please tell us:

a. What parts of the workbook need to be improved?

b. What changes would you like to see?

8. Is there anything about the format of the workbook that you have not told us that we should know about?

PART IV: OVERALL IMPRESSIONS

9. Is the material and level of difficulty of the workbook appropriate for someone preparing to enter the EPT Program?

1 = There are serious problems which must be fixed.
2 = There are some problems which should be fixed.
3 = The material is fine.
4 = The material does a really good job.

If you answered "1" or a "2", please tell us:

a. What parts of the workbook are not appropriate?

b. What changes are needed?

10. Can you identify any aspect of the workbook as being the most helpful?

1 = yes
2 = no

If you answered "yes", please tell us:

a. What you liked.

b. Why?

11. Can you identify any aspect of the workbook as being the least helpful?

1 = yes
2= no

If you answered "yes ", please tell us

a. What you disliked.

b. Why?

12. Would you recommend this booklet to a friend who needed this type of help?

1 = yes
2 = no

If you answered "no", please tell us:

a. Why?

APPENDIX C

DOCUMENT 4

TUTOR EVALUATION FORM

Student I.D. # _____

Student Program _____

Date: _____

Tutor: _____

Instructions:

Please complete a separate form for each "presenting skill need". If a Tech Prep Workbook was not used, complete only Part I of this form.

Part I

1. Please describe student's "presenting skill need".
   _____
   _____
   _____

2. Did you use a Tech Prep Workbook?
   _____ yes **(if yes go to 3)**
   _____ no **(if no go to 2.1)**

   2.1. If no, why?
   _____ didn't cover critical information
   _____ other resource covered information better
   _____ other (please specify) _____
   _____

Part II

3. Which workbook(s)?
   _____
   _____
   _____

4. Did you use this/these workbook(s) alone or with other resources?
   _____ alone
   _____ with others

Part III

5. How was/were the workbook(s) used?

_____ ***only during a tutoring session*** **(go to 5.1.)**

5.1. Were you satisfied with the workbook's usefulness as a tutoring aide?

_____ yes

_____ no

If no, why_____

_____

_____ ***only as part of a homework assignment*** **(go to 5.2.)**

5.2. To the best of your knowledge, did the student actually use the workbook at home?

_____ no

_____ yes **(go to 5.2.1.)**

5.2.1. Were you satisfied with the workbook's usefulness as homework material?

_____ yes

_____ no

If no,why?_____

_____

_____ ***both during tutoring & as homework*** **(go to 5.3)**

5.3. Were you satisfied with the workbook's usefulness as a tutoring aide?

_____ yes

_____ no

If no, why?_____

_____

5.3.1. Were you satisfied with the workbook's usefulness as homework material?

_____ yes

_____ no

If no, why? _____

_____

_____ ***other*** (please specify) _____

_____**(go to 5.4.)**

5.4. Were you satisfied with the workbook's usefulness in addressing the student's skill needs?

_____ yes

_____ no

If no, why_____

_____

Part IV

6. Were all or only parts of the workbook(s) used?
_____ all
_____ parts **(go to 6.1.)**

6.1. Which part(s)?
_____ key words
_____ practice problems
_____ methodology

7. Do you have any recommendations for improving the workbook(s)?
_____ no
_____ yes **(if yes, go to 7.1.)**

7.1 Please list the name of each workbook followed by any recommendations.
Workbook: _____
Recommendations: _____
_____
_____
_____
Workbook: _____
Recommendations: _____
_____
_____
_____
Workbook: _____
Recommendations: _____
_____
_____
_____

APPENDIX C

DOCUMENT 5

SEMINAR EVALUATION FORM

MATH FOR SUCCESS IN ELECTRONICS
EVALUATION FORM

INSTRUCTIONS: Please circle the appropriate number from 1 to 5.

1. Was the information covered in the seminar new, a review, or information you already knew?

1	2	3	4	5
new skills and information		review of skills		already knew information

2. How helpful do you believe this seminar has been in preparing you for EPT courses?

1	2	3	4	5
not at all helpful		somewhat helpful		extremely helpful

If your rating is 3 or below, please indicate why.

_____

_____

_____

3. How useful were the workbooks?

1	2	3	4	5
not at all useful		somewhat useful		extremely useful

If your rating is 3 or below, please indicate why.

_____

_____

_____

4. How understandable was the language and terms used in the workbooks?

1	2	3	4	5
difficult to understand		somewhat understandable		easily understood

If your rating is 3 or below, please indicate why.

_____

_____

_____

5. How useful was the "key word" section of the workbook?

1	2	3	4	5
not at all useful		somewhat useful		extremely useful

If your rating is 3 or below, please indicate why.

_____

_____

_____

6. Were the examples used in the workbooks easily understood?

1	2	3	4	5
difficult to understand		somewhat understandable		easily understood

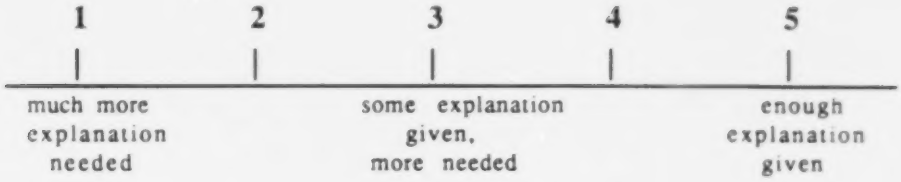
If your rating is 3 or below, please indicate why.

_____

_____

_____

7. Did the workbooks contain enough explanations to work through practice problems?



If your rating is 3 or below, please indicate why.

_____

_____

_____

8. What is your overall opinion of this seminar?

_____

_____

_____

9. Would you recommend this seminar for others entering the EPT program?

_____yes _____ no

10. Did you attend each session?

_____ yes _____no

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